Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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Volume 59 — New York, Saturday, March 18, 1922 — *Number* 11

Reducing the Operating Ratio by Cutting Labor Costs

THIS issue of the ELECTRIC RAILWAY JOURNAL has been planned to give its readers practical information on some of the labor-saving methods and types of materials-handling equipment which have been found useful by electric railways. The need for more efficient location of equipment, better shop organization and more widespread use of labor-saving equipment has long been recognized. The present necessity for taking advantage of every means for reducing costs and improving methods is so urgent, however, that the presentation of new evidence and the restatement of familiar facts are timely in order to impress on maintenance department executives the economies that will result if measures to improve conditions are actively undertaken.

Industry in all its branches is now concentrating its efforts toward a reduction of labor costs. The value of materials-handling devices in keeping up output and controlling costs was demonstrated during the war. The lessons learned should now be applied toward reducing costs and speeding up work in railway maintenance departments. A comparison of the methods used by up-to-date maintenance shops with those of smaller and less fortunate electric railways shows that the latter do not turn out work as quickly and as efficiently as the former. This is undoubtedly due to the fact that the former provide special machinery for doing various classes of work and use methods of scheduling and performing detailed operations which are laid out to give the greatest output. Particular attention should be devoted toward perfecting the output per man and providing necessary labor-saving and materials-handling equipment in order to increase this efficiency. If railway maintenance departments desire to increase their output economically they can accomplish much by using better materials-handling methods and equipment. The cost of new or additional equipment can usually be quickly saved through reduced cost of labor.

Selling Its Own Association to the Electric Railway Industry

ON MARCH 15 the committee on company and associate membership of the American Electric Railway Association inaugurated its much heralded campaign for new members. Never before in the history of the association has a membership campaign been planned so comprehensively and organized so systematically as this one. There is all the more reason, therefore, that the whole association should pull together in making the campaign a success, because lack of full success would be much more conspicuous than if the plans had been less comprehensive. To speak bluntly, it's the duty of every one to help the committee put this thing over.

The bystander might ask the question, "Why all this effort if association membership is such a good thing?" Such a query is easy to answer; for all service, even of the highest type, must be sold, and it is harder to sell than tangible, physical things. This statement applies to education, religion, journalistic service and so on. In this case, however, the problem is somewhat simplified by the fact that the American Association is a co-operative organization. It has, therefore, a stronger appeal than would some service that might seem extraneous to the industry.

Don't Make a Manufacturing Plant Out of the Maintenance Shop

THE opinion that manufacturing is outside the electric railway company's field and is seldom justified is frequently expressed. There may be circumstances where it is permissible; for example, when remoteness from the manufacturer adds considerably to the cost to transportation and makes quick delivery impossible. Another case may be one in which the volume of shop work is not sufficient to keep the men busy, so that the manufacture of some simple part can be used to fill in. The deciding factor should be that of economy, and in this respect railway officials can be easily misled by inaccurate cost accounting. Where the same force of men is used for both manufacturing and maintenance work the determination of dependable shop cost data is almost impossible. They must be determined, however, if costs are to be controlled.

The manufacturer organizes and equips his plant to carry out a definite order of operations. The workmen perform the same operation over and over again and become highly skilled at it. Machinery is carefully located to expedite movement and promote efficiency. Required tools are near at hand and needed materials are ready with promptness and in the proper place to obviate unnecessary handling. All operations are co-ordinated and carefully planned with relation to the next following or preceding one to avoid lost motion or delay in production. A specially organized production department plans the order of procedure and provides jigs, special tools, dies, etc., for rapid and efficient manufacture and to insure interchangeability of the parts when completed.

All this is quite impossible in a railway shop where a large variety of work is done. The demands made by operating requirements of a railway will not permit a corresponding degree of perfection to be obtained. The variety of work done by each man and its relatively small amount prevent the handling of the work as it is handled in manufacturing plants. There is more lost motion and the atmosphere of orderly routine which pervades a well-managed factory is lacking.

Manufacturers emphasize the value of effective supervision and strict discipline and they can take advantage of piecework to insure a proper relation between the employee's pay and his output. Railway shops, on the

other hand, are prevented from taking advantage of these economies by the restrictions of public control. As the railway supplies only its own demands, the quantities of material are small compared with the amounts used by manufacturers. The railway is thus not able to secure the lower prices of material which go with purchases in large quantities.

Manufacturing by electric railway shop forces should not be undertaken unless definite and enduring economies are gained. If such manufacturing is found advisable, it can be carried out much more efficiently and economically if the manufacturing department and its operation are definitely separated from those of the maintenance shop with the great variety of operations which it is called upon to perform.

Oblivion as a Policy

THE ideal condition for a public utility, in the opinion of a manager who has spent many years in the business, is when the public accepts its service as a matter of course. "They will never," he said, in expressing this view, "go wildly enthusiastic about the utility or be deeply grateful to it for the service it gives, and there is no reason why they should. If they go to the corner to take a car or turn the electric switch when they want light, because those two are the natural things to do when light or transportation is desired, the public relations of the company supplying the service are perfect. Its ambition should not be that of being foremost in the customer's thoughts when he has to use the car or electric service. Instead, its greatest wish should be to be forgotten. Oblivion is the end to be sought."

There is much to be said in favor of this idea. The same thought in regard to a nation is expressed in the proverb: "Happy is the country which has no history." Such a condition for a utility is far better than where the customer's first thought when he has to wait unduly for a car is that the company is and always has been inefficient, or where the company is in disfavor for one reason or another, even when the service is good. The same thought has been expressed also by the wish of some utility men that their company's name will keep off the first page of the daily paper, and that all events about it shall be chronicled purely as news in a short note or notes in the inside pages.

Nevertheless, while there may be some advantages, it is not the best condition for a country to have no history or for a utility to have no particular civic standing in the city where it operates. In many cases it is one of the largest if not the largest enterprise and taxpayer in the community, and for this reason if for no other it cannot lose its identity entirely, even if it would like to do so. Much that it does and many of its plans are of great interest to the public, which should be told about them, not in a blatant way, but simply and clearly through some means of public information.

A country without a history may be happy, but its citizens cannot take a vast amount of pride in it or have any strong sense of patriotism. In the same way, a utility which is practically unknown to those whom it serves may not incur their disfavor so long as things go just right, but it cannot be as strong in the community as if it had an established reputation for following a fair policy and being up to date.

Making Up for Lost Time in Deferred Maintenance

WHEN a man buys a piece of property, such as a house or a factory, he considers in connection with the price that he will pay the cost of putting the property into good condition if it is at all run down, and property that is changing hands, excepting that which has been built especially to be sold, is apt to be considerably out of repair. Just so in the larger case of a public utility which is being sold. Change of ownership in either case is apt to be accompanied by a wholesale liquidation of deferred maintenance. Thus a property like the railway in Toronto or Toledo, in passing from hand to hand, is given a thorough overhaul; money can be obtained for such work because the new owners are willing to give the property a fair show; they realize that they cannot expect it to demonstrate its full capacity as a money earner unless it is put into the pink of condition. And they know how to find this money under such circumstances.

The conditions in regard to backward maintenance which are made evident, and even conspicuous, in connection with a change of ownership are to some extent prevalent on all railway and railroad properties in this country today. Net incomes have been augmented, or deficits reduced, in part by cutting maintenance appropriations. This is unfortunate; if carried too far it will prove suicidal or confiscatory, depending upon the source of the compelling force which caused the appropriation slashing. There are, however, signs of improvement; managers, boards of directors and public service commissions are apparently realizing both the conditions and the possibility of finding money somehow. Fortunately, also, the costs of most of the elements of maintenance are coming down. This fact should be utilized to permit the making up of lost time in maintenance work, and fares should be reduced slowly enough to make it possible to recoup the impairment of capital caused by deferred maintenance.

When a full realization of the effects of further deferring rehabilitation is reached there will be a rather sudden reaction. The expenditure of millions of dollars within a few recent months in Toronto for this work illustrates on an extreme scale what must happen generally on a smaller scale very soon. Now is the time to get ready for the coming activity. As in Toronto, the careful preparation of plans and specifications, the utilization of standards which have been developed by the national engineering associations and the wise provision of labor- and time-saving machinery will in the end bring big returns.

Continue the Use of Labor-Saving Devices in Track Maintenance

FOR some reason expenditures for track maintenance are usually the first to feel a cut when times are hard and the last to be resumed when times get better. It may be taken as an index that better times are at hand when the news columns of this paper begin, as they are now doing, to record large track programs to be undertaken by the different companies.

In considering these programs the engineers should not overlook the fact that the times just passed have served at least one good purpose in teaching the value of labor-saving devices in track construction and maintenance. Probably no other means would have taught

the lesson that labor costs could be lessened, even at increased rates of wages, by the use of labor-saving machinery and tools. Having learned the lesson, it should be their plan to continue the use of such devices and at the same time to attempt an even more intensive application thereof. The fact that the labor rate is lower furnishes no reason for any let-up in the saving of labor; there are yet a number of operations in track maintenance which are ripe for the application of labor-saving methods and devices. For instance, there is room for the development of some mechanical means for loading excavated materials, such as old concrete, earth and paving materials, upon work cars following the removal of the materials from the track. Most of this work is still done manually and there must be some way to do it mechanically, in part at least, at a lower labor cost. There are, of course, many operations which will continue to require manual labor, but the slogan should be "find a way or make one" to do it mechanically."

It Is Up to the Men Now

FINANCIAL success in the electric railway business depends more and more on the little economies. It is these economies multiplied by the tremendous units in which the business deals over the period of a year that make or mar profits. Almost from the start under Mr. Mitten in Philadelphia it has been greatly to the interest of the employees there to be careful in little things. Under the new plan for participation by the employees of the company in the profits of the company the men and women there will have more at stake than ever before. As matters now stand it is not stretching the point any to say that the proposal now under way in Philadelphia for employee participation in management and in profits after a return has been made to stockholders is an experiment that merits much wider attention than it has apparently received so far.

Participation in profits by empjloyees is, of course, not a new idea, though it has not been practiced to any great extent in the public utility field. In the Philadelphia case, however, the plan may be regarded as starting under particularly auspicious circumstances because there is a background of understanding and respect between management and men, built up over a period of more than ten years. During this time the effort has been gradually to educate the employees to a realization of the responsibilities imposed under the plan which will now go into effect.

The idea behind the Philadelphia proposal should be looked at impersonally. There is a good deal of prejudice in human nature. Mr. Mitten understands this perhaps much better than do his critics. As a result of the accomplishments of the past in Philadelphia under the policy of co-operative management the employees naturally are jubilant at the election of the entire Mitten slate to the board of directors and at the prospects ahead of them the coming year. Back of it all, however, evidence is not lacking that the employees realize more than ever before the burden that now rests with management and men, and that with success has come greatly added responsibility. If the spirit of the employees at Philadelphia as exemplified there in the past twelve years is any criterion for the future, then the lesson of what they will accomplish during the coming year may afford one of the brightest pages in the history of industrial relations. The management has done its part. It is up to the men now.

How Can Engineers Function Collectively?

THIS is an engineering age, and there are many national, state and municipal questions on which the views of the engineering profession as a whole would be most helpful. The problem is to make these views articulate. It was in recognition of this condition and with a sense of obligation to render such public service as they could collectively that the engineers of the country, by and large, formed a federation of their various national and local societies. Organized in the fall of 1920, this federation—The Federated American Engineering Societies—is still hunting the best answer to the question "How Can Engineers Function Collectively?"

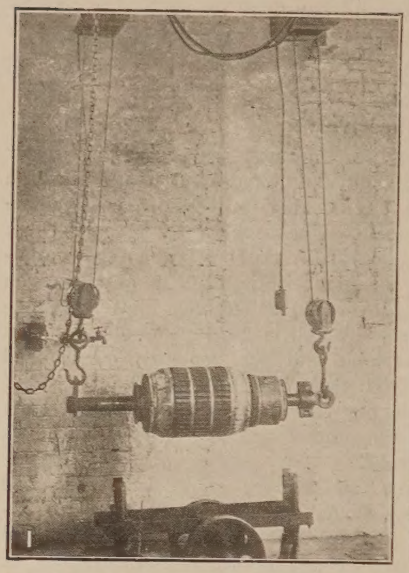
During the first few months of its existence, the Federated Societies moved forward under the stimulating leadership of Herbert Hoover. The conception and the preparation of the report on the elimination of waste in industry gave point and direction at the start to the activities of all engineers. The problem now before the federation is to effect an every-day working method of collective action by engineers, and this is a two-part problem, namely, (1) to find those broad subjects in which all engineers may have a definite interest in the field of their common activity, and (2) to give collective expression to the views obtained on these subjects. The body of men making up the executive board is fully aware of the necessity of so organizing the work of the federation that both these objects may be attained. At last week's meeting of the executive board in Chicago President Cooley, just returned from a swing around the circle of member societies, gave voice to the thought that the principal program to be worked out during the immediate future is not so much to study and report on different subjects as organization and method.

The list of accomplishments of the meeting in Chicago is a list of resolutions tabled, and from one point of view seems to indicate a complete failure of the federation to function. Looking deeper than the surface indications, however, the problem is better stated by saying that the questions came before the federation in such a form that it was not possible to pass intelligent judgment upon them, and the federation is to be commended for refusing to go on record on a group of problems of which it had no intimate knowledge.

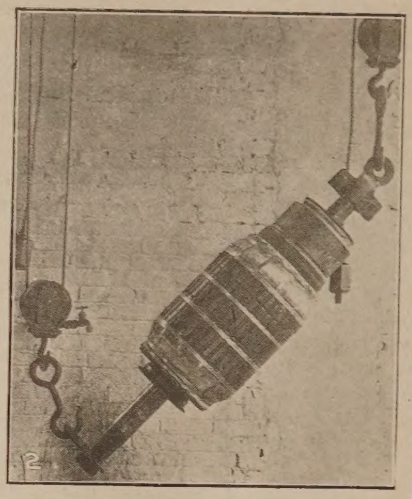
All this may seem somewhat foreign to the electric railway business. Actually, it is closely related, for two reasons. One is that the electric railway industry is an engineering industry and contains many engineers whose voice will be eventually heard on problems which the federation must consider. The other is that once collective engineering action and opinion is made effective in the service of the nation, the electric railway industry will be better understood by the public and will share in any benefits which are generally effected.

So, to this effort of the engineers, encouragement should be given. Little by little, the federation is making progress in its problem of organization. When this is solved engineers will be able to do collective work effectively.

Handling Armatures for Dipping and Baking

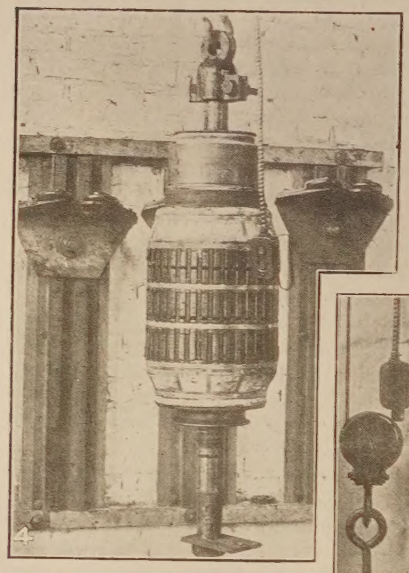


No. 1—Delivering armature to traveling crane serving dipping tank.

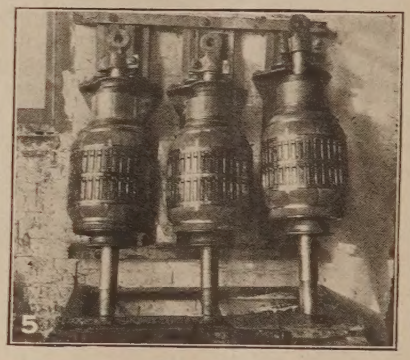


No. 2—Changing to vertical position in preparation for dipping.

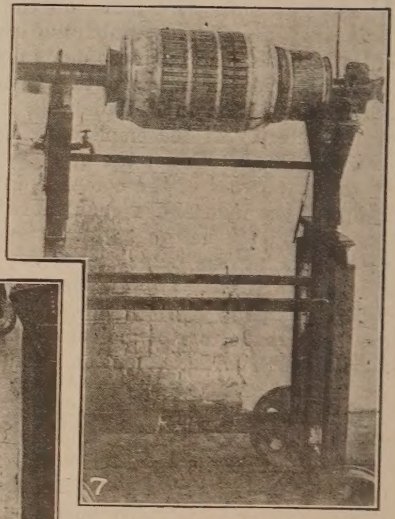
No. 3—One of the two hoists lowers armature into tank, pinion end down.



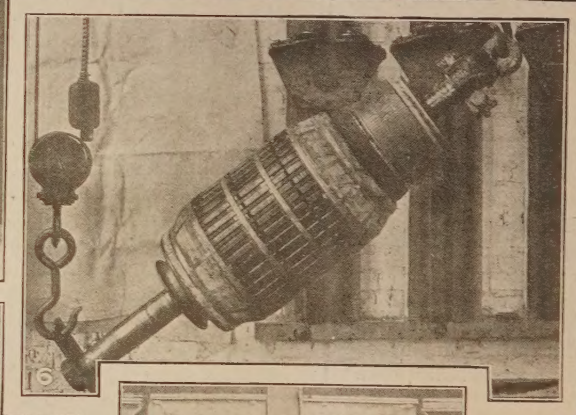
No. 4—After dipping, the armature is lifted to the adjacent drain rack.



No. 5—Special drain rack holds armatures in tilted position and permits easy rotation.

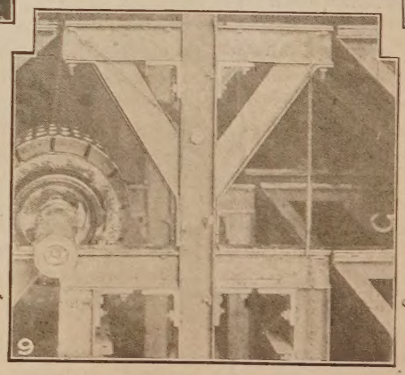


No. 7—Armature placed on truck by crane hoists for transfer to oven.

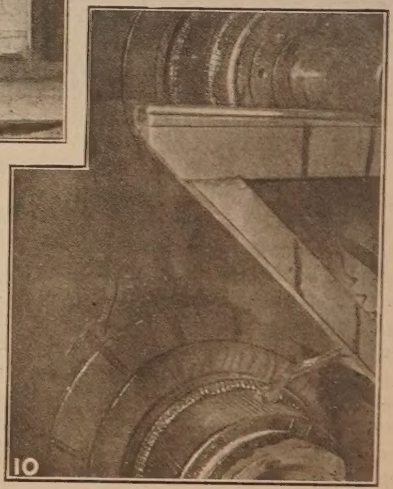


No. 6—Removing armature from drain rack and changing to horizontal position.

No. 8—Rolling armature from truck to oven rack.



No. 9—Double racks on either side of aisle in oven give capacity of twenty-four armatures.



No. 10—Automatic contact which permits insulation testing from outside of oven.

Expediting Armature Repair Work

Features of New Baking and Dipping Outfit in Kansas City Railways Shop Are the Special Provisions for Efficient Handling and Testing of the Armatures—Insulation Condition of Each Armature Can Be Followed as It Bakes—Experience Related as to Best Practice in Baking Process

By Henry S. Day
Equipment Engineer Kansas City (Mo.) Railways

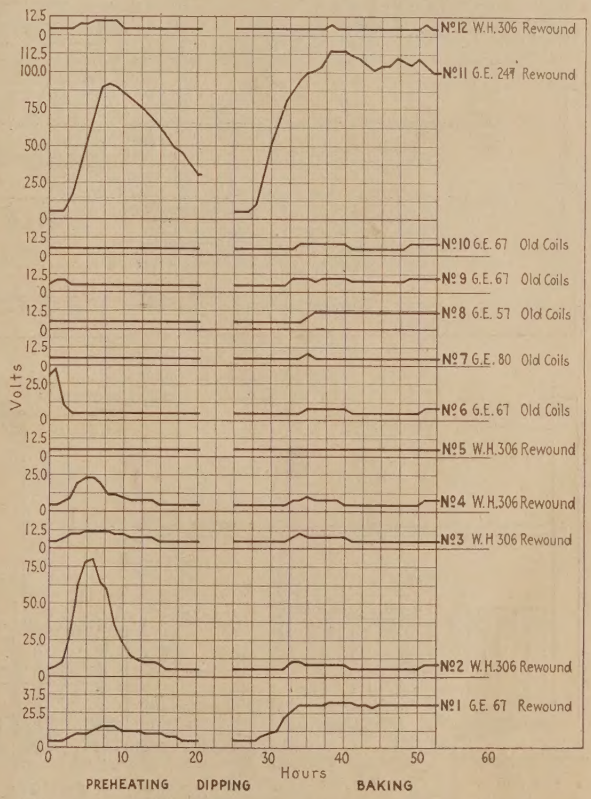
AN ELECTRIC baking oven with special facilities for handling, dipping and baking armatures was designed and installed on this property by the writer during 1921. Baking ovens are now in rather general use, and in the main the methods followed are about the same, although there is still much discussion as to how the varnish should be applied, how the armatures should be drained and how long they should be baked. The object in view in working out the scheme installed in Kansas City was to provide equipment and facilities which would reduce to a minimum the handling operations and make possible the repairing of armatures on a quantity production basis with correspondingly low labor cost.

The new oven is divided into two compartments, each being an exact duplicate of the other and operated as an individual unit. Each compartment has rack capacity for twelve armatures, six on either side, with an aisle between racks in which a 34¾-in. gage track extends entirely through the oven and to the extreme end of the section of the shop where this repair process is carried on. Both ends of the oven compartments are equipped with doors that are connected with counterweights, which have proved to be an excellent feature, as the doors are easily and quickly raised or lowered and remain in whatever position is desired. The installation of doors on both ends of the compartments has also been well worth while as they increase the flexibility of the oven and make it possible to pass out armatures from either end so that there is no waiting time between operations. The arrangement of having an aisle between racks gives ready accessibility to any particular armature or to field and miscellaneous coils stacked on skeleton shelves placed on the racks when armatures are not being baked.

The oven is set on a concrete floor. The walls and roof are constructed of ⅛-in. sheet iron and 1-in. sponge asbestos supported on 1-in. special channel iron. The outside is ⅛-in. sheet iron which is insulated from the channel iron with ½-in. transite, thus providing a ½-in. air space. Nearly all seams are welded, and tests have shown that there is very little radiation of heat.

After many tests to determine the best baking temperature, the thermostatic control was set to cut the electric heaters in at 230 deg. F. and out at 240 deg. F. With this automatic heat control the ovens require no attention from the operator during the baking period. The heating units are standard Westinghouse equipment, type C oven heaters, and also the control, including push-button switches which automatically cut off the current from the heaters whenever the doors are opened.

For placing armatures in oven, a steel-frame, four-wheel truck is used which has fixed levels matching up with both the upper and lower tier of racks in the oven. The armatures are thus easily rolled by hand from truck to rack and vice versa. The truck wheels are fitted with roller bearings so that even with a maximum armature load the truck is readily moved by hand. The brackets are faced with copper, as are also the racks in the oven, so as to protect the armature shafts. When an armature is placed on the truck it is prevented from rolling off by a taper pin inserted in a hole drilled in



TYPICAL INSULATION CURVES FOR ARMATURES IN COURSE OF DIPPING AND BAKING

the armature rest. This pin is chained to the truck to prevent its being lost. The truck will hold two armatures at a time, one on either level. The design of the truck eliminates the necessity of raising or lowering an armature in order to transfer it from truck to rack or vice versa. Hence one operator can easily and quickly push the truck into the oven and roll the armature onto the rack ready for drying or baking.

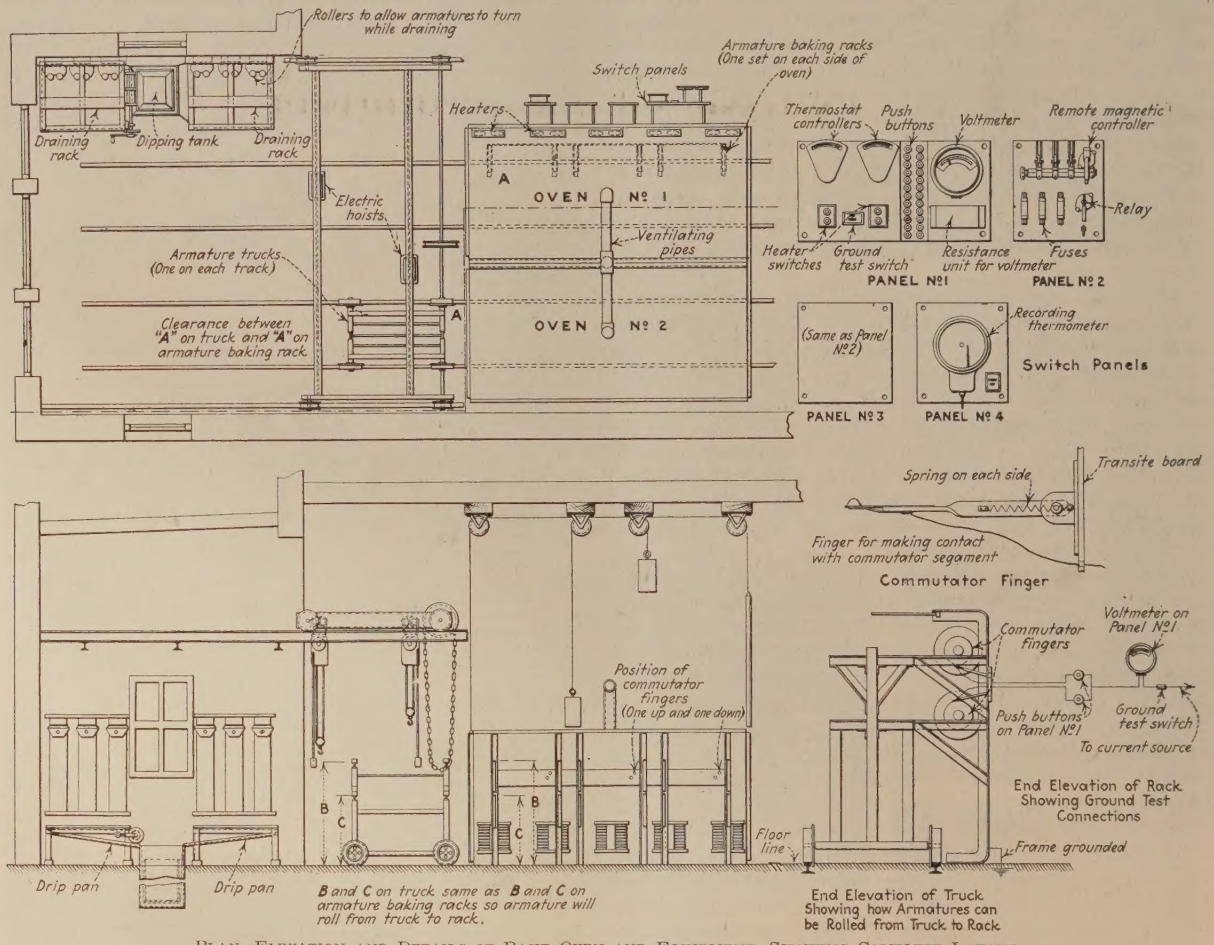
Reference to the plan drawing reproduced herewith will show that the section of the shop at the end of the oven where the dipping is accomplished is served by an overhead traveling crane equipped with two electric hoists. This crane serves the entire section for both compartments and each compartment is served by its individual oven truck, such as has just been described, for transferring the armatures in and out of the oven.

Armatures are dipped pinion end down and immersed in varnish up to the commutator ears, but not over. The draining is done by supporting the armature so that it rests at a sharp angle with the vertical. This is obtained by setting the pinion end of the armature shaft on a center pin and leaning the commutator end against two rollers supported on slides against the wall. Thus supported on a steel-point center the armature can easily be rotated. As soon as an armature is removed from the varnish and placed on the drain rack the operator gives it a quarter to a half turn at short intervals, according to the way it drips during the entire draining period. With the armature at the angle described this thoroughly drains all free varnish and prevents pocketing and unbalancing. Differences in lengths of armature shafts were taken into account by mounting the rollers in slides to permit them to be raised or lowered easily.

As it was desired completely to immerse the armature in the varnish, pinion end down, a bottle-shaped clamp was designed, having a copper lining to protect the shaft, and arranged to be clamped over the commutator end. This allows the armature to be lowered into the varnish in an exactly vertical position. The copper lining of the clamp not only protects the shaft but supplies sufficient friction to make the clamp perfectly safe. This clamp is put on when the armature is first brought to the dipping tank and it remains on the shaft until the armature is dipped and drained and ready for the oven.

As the lengths and diameters of the armatures handled vary considerably, the dipping tanks were built with a false wooden bottom which can be raised and lowered by a small hand windlass. As soon as an armature is lowered to the desired depth in the varnish, the bottom is raised until it carries the weight of the armature, and the windlass is locked there by a dog. A wooden framework is then secured to the upper or commutator end of the shaft, holding the armature in an exactly vertical position so that the crane and hoist can be released for other work.

When the draining of an armature has been finished and it is ready for the oven, the front hoist on the crane is used to lift the armature from the drain rack into the air. The pinion end is then picked up with the rear hoist and the armature is returned to a horizontal position and placed on the truck for transfer to the oven. Accompanying photographs show the sequence of operations from the time the armature is delivered to the crane from the floor truck to the time it is placed on the racks in the oven.



PLAN, ELEVATION AND DETAILS OF BAKE OVEN AND EQUIPMENT, SHOWING COMPLETE LAYOUT

INSULATION IS TESTED PERIODICALLY WHILE ARMATURES BAKE

A feature of this oven which has been found to be of great value is a method of testing the insulation of each armature while it is in the oven. This is shown on the drawing and also in one of the photographs. The arrangement consists of a contact finger mounted on a

transite board and fitted with springs so as to provide pressure against the commutator. This contact is arranged to snap forward or back of the center so that when it is disengaged it will snap back out of the way, and as soon as an armature is placed on the rack a slight movement again snaps it against the commutator. The contact is connected through a 500-volt push button, a voltmeter and a switch to a 500-volt circuit. With the racks in the oven grounded, this gives a ground or insulation test. Each armature location in the oven is numbered, the lower tier being odd and the upper even to correspond with the numbers on the push buttons. The twenty-four push buttons thus make it possible at any time during a baking period to take a voltmeter reading for any armature and determine the insulation condition without opening the doors and cooling off the oven. While most armatures will show much the same curve of voltmeter readings, an occasional one will require special treatment and this arrangement eliminates all guesswork.

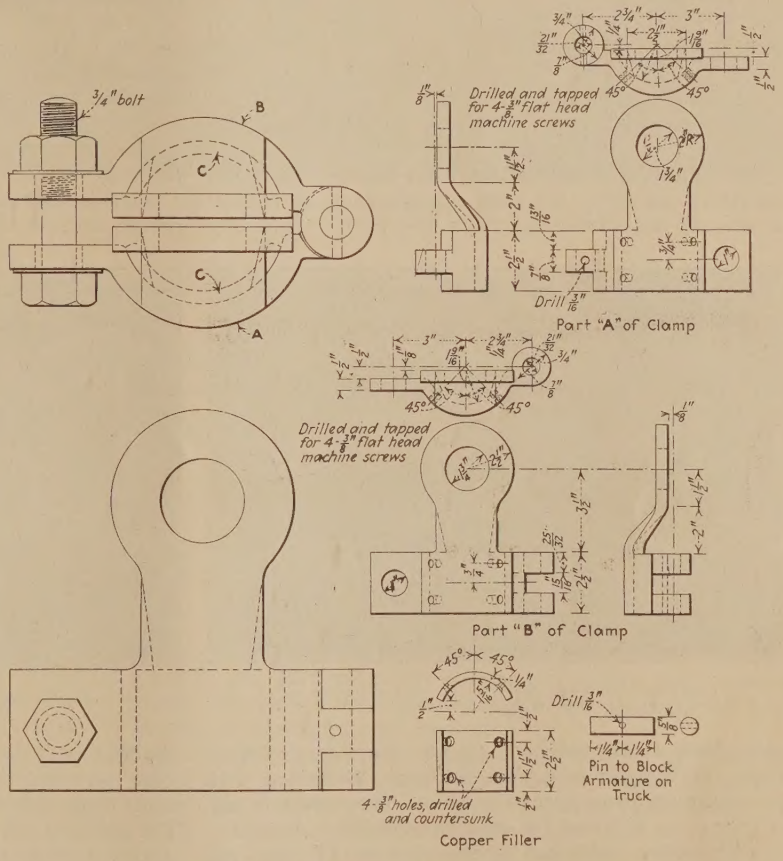
It will be noted that the drawing shows a ventilating duct for each oven compartment, but not much stress has been laid on this point. Both natural and forced ventilation have been tried and tests of several different batches of armatures made with each method of ventilation, and also without any ventilation, and little if any difference has been found in the results obtained.

Preheating, Dipping and Baking Time Determined

Just how long an armature should be preheated, allowed to remain in the varnish, drained and finally baked, seems to be a matter for each engineer to decide for himself. In the end, the time allowances depend on the results obtained if the tests leading up to the results have been carefully worked out. Results with this oven unquestionably have been excellent, and after many lengthy tests certain standards have been adopted and are now being followed in the daily operation. These standards are very simple. All armatures, both old and rewound, are preheated from twelve to fourteen hours. As a rule all armatures will test practically clear with this number of hours of preheating, but if any armature in the batch shows a high voltage reading it is kept in the oven until it comes down. If the reading grows constant near the peak the armature is taken out and the trouble located, even if this requires removing bands and lifting coils. Sometimes a rewound armature with green coils will show a reluctance to clear, but eventually will come down with sufficient heating.

After preheating, the armatures are dipped in varnish having a specific gravity which is kept as nearly as possible at 0.875 Beaumé by the addition of new varnish or benezine and allowed to remain in the varnish until all bubbling stops. This of course indicates that all air pockets have been penetrated. The armatures are then drained from fifteen to twenty-five minutes and then placed in the oven. When the oven is charged to its full capacity it is closed up and the heat turned on and kept on from twenty-five to thirty-five hours. Readings are taken at intervals during the baking period, and unless some one or more armatures show a high voltage reading, the oven is opened at the end of the normal period and the armatures released for commutator turning and slotting, if necessary, as soon as they are cooled.

When the oven was first started various tests were made with and without ventilation, some over a period of ninety hours in which ten-minute voltmeter readings were taken from start to finish. The chart shown here-



ASSEMBLY AND DETAILS OF ARMATURE LIFTING CLAMP

with gives some typical curves which in most cases show that armatures were practically clear during the entire operation, although it will be noted that one curve disclosed an armature that at the end of the baking period indicated that the insulation resistance in the coils was low. As a matter of fact in the daily operation of the oven the voltmeter test on the average armature does not tell much, but it does show up the armature with weak insulation. In arriving at the twelve to fourteen hour preheat period, the voltmeter test showed practically all armatures clear, while anything less than that was not certain. In arriving at the twenty-five to thirty-five hour baking period, armatures that had been baked a much longer time were stripped and the coils and insulation were examined to find out what the penetration was, whether there were any pockets of wet varnish and to what extent the varnish had dried. By

first taking an armature that had actually baked sixty or seventy hours and examining the condition of the insulation by opening the windings and then working back in the same manner on armatures that had been baked for shorter periods, it was eventually determined that this twenty-five to thirty-five hour period was sufficient.

The following table gives the capacity of the oven with both units working up to maximum:

First Batch of Twelve Armatures		
Monday	5:00 P. M.	In for preheat
Tuesday	7:00 A. M.	Out for dipping
	10:00 A. M.	In for bake
Wednesday	4:00 P. M.	Out; end of bake period
Second Batch of Twelve Armatures		
Wednesday	5:00 P. M.	In for preheat
Thursday	7:00 A. M.	Out for dipping
	10:00 A. M	In for bake
Friday	4:00 P. M.	Out; end of bake period
Third Batch of Twelve Armatures		
Friday	5:00 P. M.	In for preheat
Saturday	7:00 A. M.	Out for dipping
	10:00 A. M.	In for bake
Sunday	4:00 P. M.	Out; end of bake period

This schedule produces thirty-six dipped and baked armatures per week for each compartment, or a total of seventy-two armatures from the oven. This also gives from 4 p.m. Sunday to 7 a.m. Monday, or fifteen hours, for baking coils, etc., without interfering with the maximum capacity of the oven. This schedule can, of course, be adjusted for greater capacity if desired.

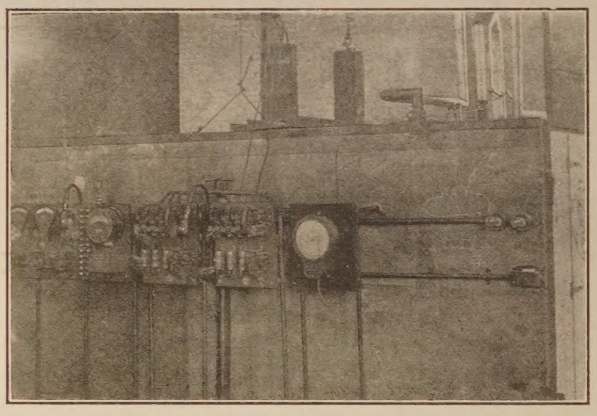
With energy delivered at the oven at 1½ cents per kilowatt-hour, varnish at $1.87 per gallon and two operators at 45 cents per hour, it is costing $2.765 per armature to bake and dip. This cost is figured from the total number of armatures dipped and baked per month without regard to size and comprising G.E. types 57, 67, 70, 80, 247 and 258, and Westinghouse types 506 and 306. This cost has been carefully checked and is very close to the exact cost of the operation.

The total investment in the baking oven and auxiliary equipment in the Kansas City shops amounts to very close to $6,000. It should be explained that this investment includes from $1,500 to $2,000 of development costs, which would not be involved in building another similar installation. To get at the total cost per armature, including overhead, interest on the $6,000 investment is figured at 6 per cent, or a total per year of $360. While the total capacity of the baking and dipping facilities is seventy-two armatures a week, the actual production will be about forty-eight a week, as this will take care of the normal overhaul program. This amounts to 2,500 armatures per year, over which the interest charge is spread, or an interest charge per armature of 14.4 cents. Adding this to the $2.76 labor and material cost above, the total cost per armature is $2.91.

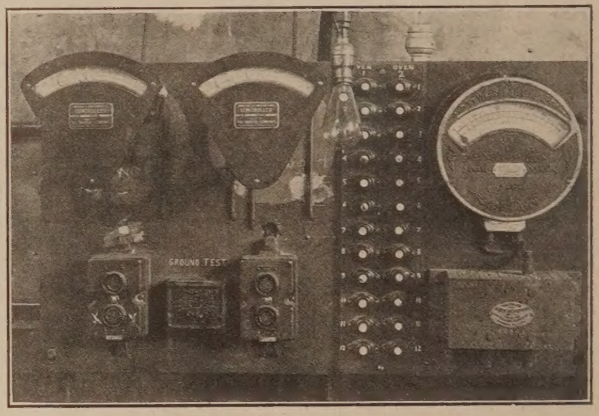
Operating Results Will Decide Baking Period

Some engineers may claim that with this cost per armature the expense is too high to justify the process, but the results already obtained on this property contradict such a claim. The question has also been frequently discussed as to how often an armature should be dipped and baked. It would probably be difficult to set up any given period of time or number of miles for an armature to remain in service between baking operations, but on this road it has finally been decided that all armatures and field coils will be dipped and baked when the cars are put through the shop for the regular overhaul, which is conducted on a 45,000-mile basis, or approximately every sixteen months. Following this schedule has already substantially reduced the number of motor failures.

A great deal of time and study has been given to the design and use of this baking outfit in order to obtain the best possible results. Whether or not the best results have now been attained is not yet certain, but the study from now on must be one of service observations. For instance, the writer was always inclined to a longer baking period, but as the results with the time and method described are certainly good, it is the intention to continue the work along the present lines and keep a close check on operations at the oven and the performance of the armatures in service, and from time to time make any changes that may be suggested from the data gathered.



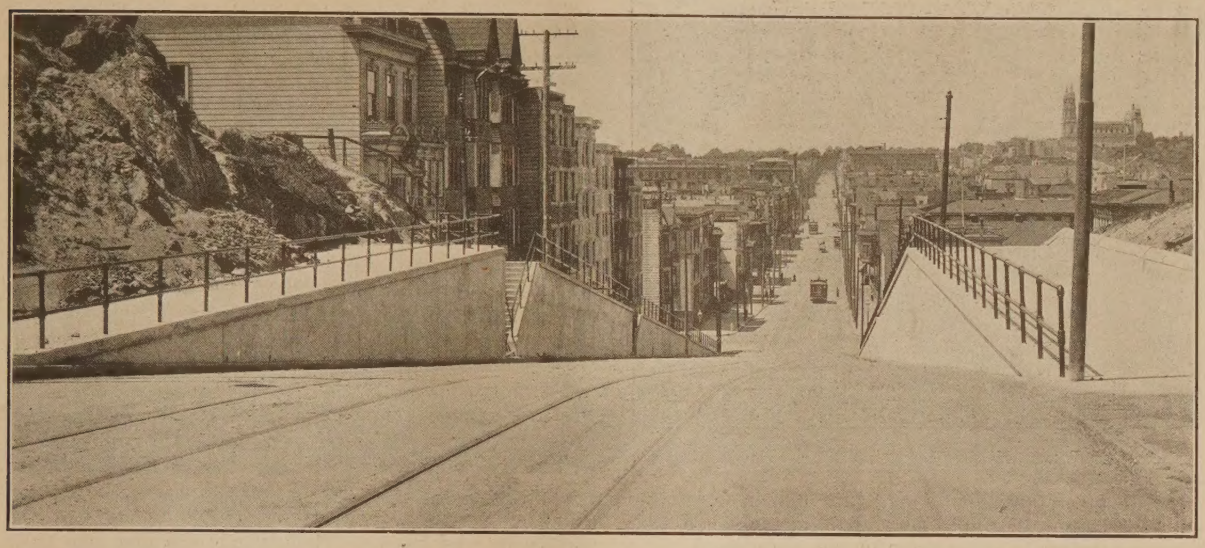
Control and Test Equipment as Installed on Side of Baking Oven



Close-up of Push Buttons and Instruments for Testing Any Armature in the Oven

Report on Rail Corrugation

A COMMITTEE of the Municipal Tramways Association in England which for the past five years has been investigating the subject of rail corrugation has recently made a report. This states that all observations lead to the conclusion that corrugation of steel rails is inseparable from the action of heavily loaded wheels rolling along the surface of the tread of the rails. It appears that this rolling originates the corrugation by giving rise to superficial stresses in the material of the rail tread which are in excess of the elastic limit and of the toughness of the material.



ONE OF THE SEVERE GRADES OF THE MARKET STREET RAILWAY SYSTEM

Give Your Motors a Chance to Make Good

Through Careful Attention to Maintenance Details the Market Street Railway of San Francisco Operates Old Type Motors in Extremely Severe Service Without Excessive Trouble

BY J. M. YOUNT
Master Mechanic Market Street Railway, San Francisco, Cal.

RECENTLY the Market Street Railway constructed some new cars, and in giving the motor manufacturers the data it was stated that the motors for each car should be four 40-hp. and of an interpole ventilated type. The cars were to weigh 40,000 lb. complete, and all other data were given. One manufacturer refused to guarantee the service temperature of the motors under the conditions given. This caused us to stop and reflect: Why would not the manufacturer guarantee new, up-to-date motors for a service in which we were using old motors of much smaller size with satisfaction? Here we were operating 33 per cent of our cars, weighing 42,000 lb., with four 35-hp. GE-1,000 motors purchased between the years 1900 and 1903, on lines with grades as high as 13 per cent. These motors were performing economically from every standpoint.

As most all electric railways have a considerable number of old-type motors, it may be of interest to know of our system of handling the 900 GE-1,000 motors which we have in daily service. On account of the big fire in 1906 and the strike of 1907 our car equipment did not get the care due it. In 1910 we were looking with envy toward those companies that were replacing the GE-1,000 motors with up-to-date equipment. There was no hope for us in the way of new equipment, however, on account of finances, so we kept a record of the principal faults of this type of motor, and then we endeavored to provide a means to overcome them. The principal trouble consisted of grounded commutators, flashing over at commutators, bent brush holders, bent brush holder yokes, open circuits in leads, holes burned in neck of connections and field terminals burned off.

The above troubles seemed to have about condemned the motors to the scrap pile. We found that the grounded commutators could be traced to the oil from commutator end bearing creeping over onto the string band, collecting carbon dust and thereby eventually causing a ground. We substituted solidified oil and waste in place of oil for lubrication and there was an improvement. Next we eliminated the string band and oil linen from the mica ring and painted the mica ring and face of the commutator with a paint made of shellac and oxide of iron. Since then grounded GE-1,000 commutators have been rare.

The problem of reducing the number of flashovers was a difficult one, as there were so many things that could cause this trouble. A century field tester was purchased and a survey was made of all the field coils in use. The result showed 600 fields short circuited. These were replaced with impregnated fields, which produced an improvement. Commutators were next slotted, and a proper carbon brush was selected, another improvement. Brush yokes and holders were set with a templet and brushes were checked to insure proper spacing. Now in place of going over 13 per cent grades in series, a four-motor car weighing 42,000 lb., equipped with GE-1,000 motors, loaded with 125 passengers, takes the grades in full parallel without flashing. We paint our brush yokes with the same paint as is used on commutators. Open circuits in leads and holes burned in connections, in the majority of cases, can be traced to mechanical faults, such as loose commutator shells, loose end bells or loose core laminations.

We are very particular before rewinding a core to see that commutator shells, end bells and laminations are as they should be. We have replaced the cast-iron nut that holds the laminations together with a steel one made from a section of a fifteen-tooth pinion. We are

MOTOR CLEANING AND OVERHAULING DEPARTMENT

able to get a wrench to fit over this and make it tight while the laminations are under hydraulic pressure. The foregoing refers to work done by the main shop.

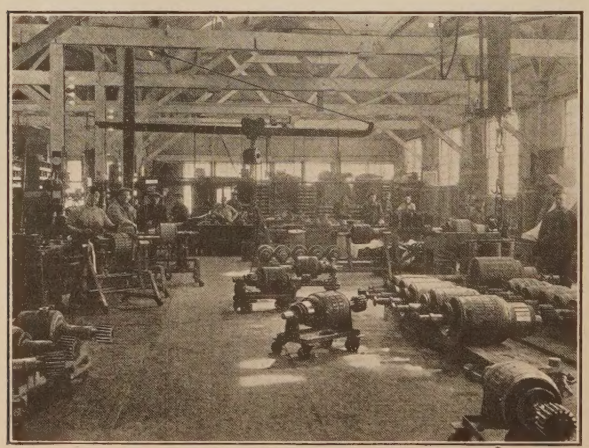
With the use of solidified oil and waste as a lubricant, we have determined that the motors will safely operate 1,400 car-miles, so we have set that period for operating between car inspections. We make a daylight inspection as follows: One gill of solidified oil mixed carefully with the waste is added to a bearing. Very little new waste is added and the oiler uses his own judgment as to the amount to use. Any new waste added is placed next to the bearing. Brushes are removed from brush holders and wiped off and the brush holder springs are tested. Brush yokes are tested for loose brackets and splits. Special attention is given to the proper spacing of brushes between brush holders and to lining up the brushes properly with the commutator. The commutator slots are cleaned and brushed out with a fine wire brush.

The outer mica ring of the commutator is cleaned off and is painted with shellac and oxide of iron paint, when necessary. The armature bearings are inspected for wear in the housings. A feeler is passed between the fields and the armature for a test of clearance. Field coils are inspected to see if they are clamped tight.

The general overhauling of the motor is most important. This we do on a 70,000-mile basis and in a thorough manner. The motor is dismantled from the truck and is taken by a crane to the motor overhauling department. There the motor is opened up, the armature is taken to armature room, fields are tested for short circuits and then they are removed from the core and inspected. All field jumpers and leads are sleeved with brass sleeves and are put in condition for another run of 70,000 miles. Mechanics highly skilled in assembling motors are a wonderful asset, and it is to them that a great deal of our success is due. In bolting the field piece to the motor frame we are very careful to see that they come together tightly without air gap.

As some railway properties are able to buy modern motors and scrap the GE-1,000 type, we have been able to pick up the GE-1,000 motors complete for less than the new value of the field coils in them. In dismantling these old motors we have learned why the different properties were unable to run them with satisfaction and we will gamble that if the new motors are allowed to go by default the same way that these motors have, within six years they will be giving as much or more trouble than the GE-1,000. For instance, we purchased some motors and found the throw of the leads of the armatures was wrong. They would run one way O.K. but would blow when operating in the reverse direction. Another road scrapped a number of them on account of high maintenance cost and frequent pull-ins. We found the field coils too thick, not allowing the pole pieces to come in contact with the frame, thus causing an air gap and spoiling the magnetic field.

The month of January, 1922, was very rainy; in fact, it was the worst month we have had for years. The number of cars equipped with GE-1,000 motors turned in for motor trouble was forty-seven, booked as follows: Thirty-six for armature trouble, six for field trouble and five for brush holders. The mileage made by cars equipped with GE-1,000s for the month was 639,464 or 13,600 car-miles per turn-in for motor trouble. We have interpole motors operating on our system that were purchased eight and ten years ago. These operate with less weight of car per rated horsepower than the GE-1,000, and as regards economical maintenance they have but little margin on the GE-1,000. They are, however, more satisfactory from the operating standpoint inasmuch as they will stand much faster feeding of the controller. In the last twenty years the manufacturers have made us good motors, but we, who operate them, have not always given them a fair chance to make good, and many have gone to the junk pile that if properly operated and maintained would have lasted for years.



A CORNER OF THE ARMATURE ROOM. DIPPING TANK AT RIGHT WITH ARMATURE IN PLACE

ASSEMBLING MOTOR PARTS IN SHOPS OF THE MARKET STREET RAILWAY

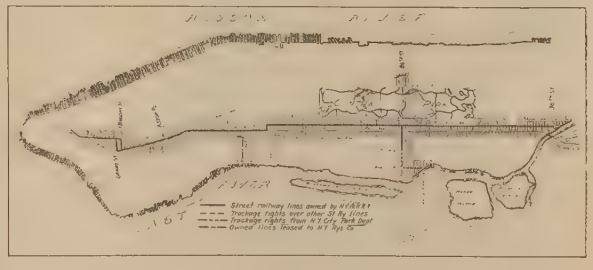
NEW YORK & HARLEM STORAGE YARD AND ADMINISTRATION AND SHOP BUILDING, LOCATED AT 135TH STREET AND MADISON AVENUE, NEW YORK CITY. OUTDOOR TRANSFER TABLE IN FOREGROUND, SHOP BUILDING IN BACKGROUND

New Maintenance Facilities for New York & Harlem Traction Lines

Former Part of New York (N. Y.) Railways, Operated Independently Since Feb. 1, 1920, Has New Maintenance Shop and Administration Building and Unique Storage Yard at 135th Street and Madison Avenue

ON FEB. 1, 1920, the 999-year lease of the Fourth and Madison Avenues and the Eighty-sixth Street Crosstown Lines in New York City to the New York Railways was terminated. The latter simply could not pay the rent.* When the owners took over the property they were illy equipped to operate it, as the maintenance work and general administration had been completely merged with that of the lessees. However, by drafting several members of the staff of the New York State Railways, controlled by the same financial interests, the management was able promptly to adjust itself to the new conditions. Temporary storage and maintenance arrangements were made with the former lessees and others, but as rapidly as possible the New York & Harlem provided for complete independence.

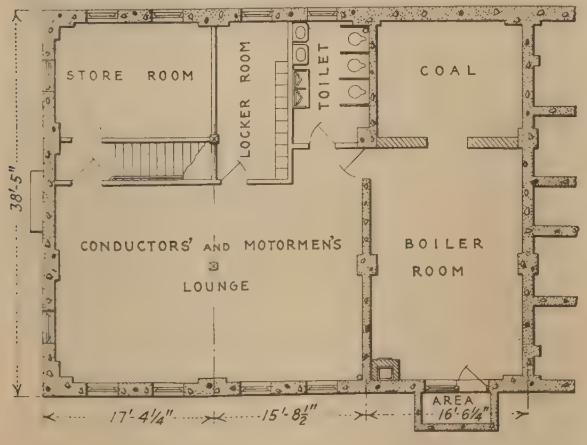
The first step was to provide for repair-shop quarters,



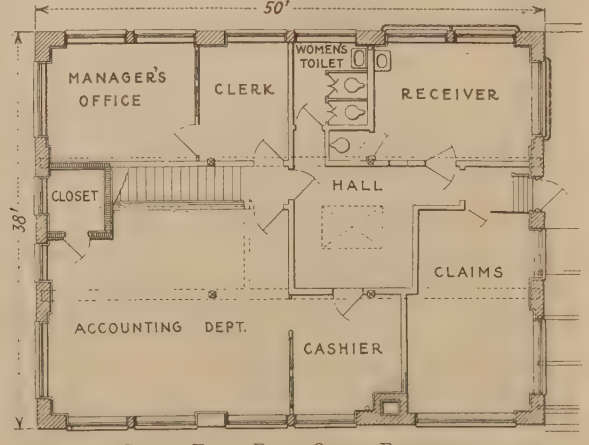
OUTLINE MAP OF NEW YORK & HARLEM TRACTION LINES

which was done by renting space in the carhouse of the Second Avenue Railroad at 1874 Second Avenue. Plans were also laid for abandoning the carhouse and temporary headquarters on Fourth Avenue at Thirty-second Street, for which satisfactory rental terms could not be obtained. A piece of property owned by the com-

*For details of the return of the properties to the owners see the issue of this paper for Feb. 7, 1920, page 305.



BASEMENT PLAN OF OFFICE BUILDING



SECOND-FLOOR PLAN, OFFICE BUILDING

New York & Harlem Traction Lines Have Up-to-Date Operating Headquarters

No. 1—Madison Avenue front of property, with inbound and outbound tracks.

No. 2 — Corner of building showing 135th Street façade.

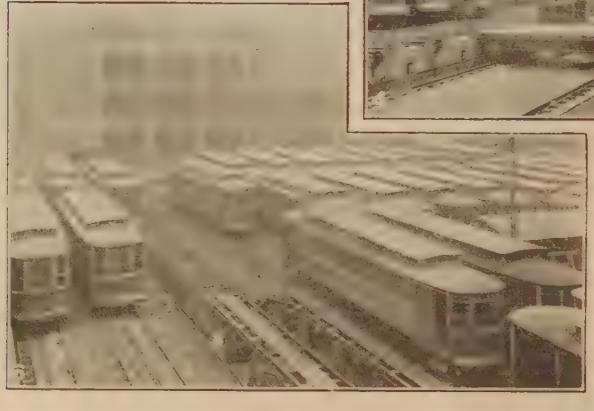
No. 3 — Armature rack with bale for handling armatures by means of crane.

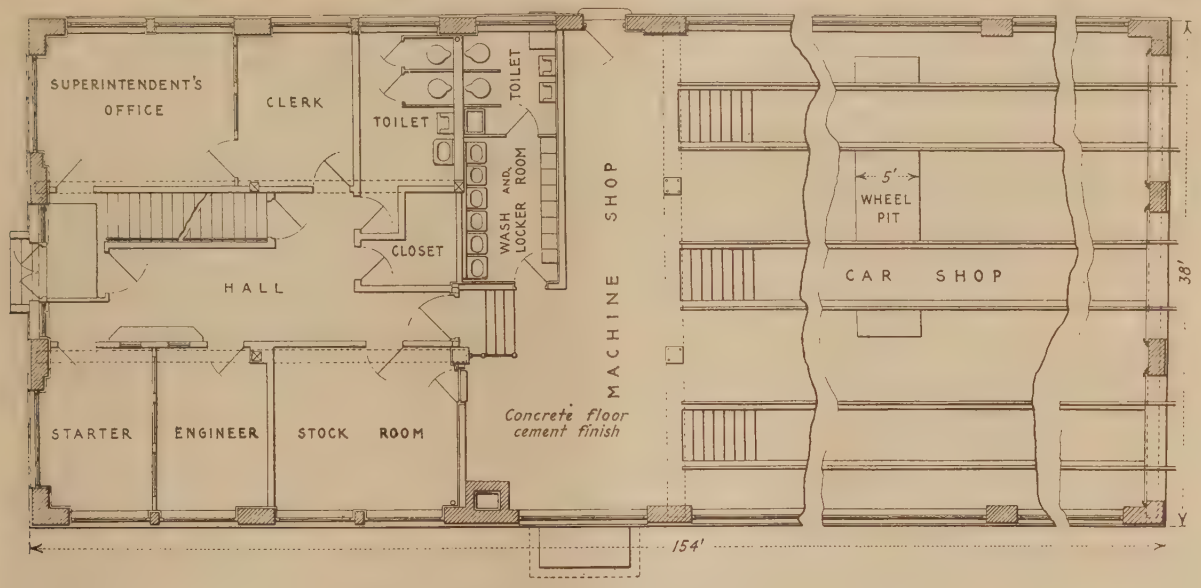
No. 4 — Transfer table used for shifting cars in yard.

No. 5 — Overhead trolley bars and trolleys for supplying electric power and light.

No. 6—Another view in the yard showing outdoor pits in foreground.

No. 7—View of yard entrance and building from rear.





GENERAL PLAN OF FIRST FLOOR OF CAR SHOP AND OFFICE BUILDING

pany at 135th Street and Madison Avenue was laid out as the site for an open car-storage yard and a general administration and auxiliary maintenance shop building. This work is now complete and its salient features are covered in the present article. Construction work was begun July 1, 1921, and completed Nov. 1. The heavy maintenance work will continue to be done at the main shops mentioned above. These will be taken up at an early date in this paper.

ENGINEERING CONSIDERATIONS INVOLVED IN THIS JOB

The specifications which confronted the engineers in commencing the design of this layout were principally as follows:

1. A site of limited area and irregular form and bounded in part by the property of other owners was to be utilized to provide: (a) Storage space to accommodate the maximum possible number of cars; (b) a building of dimensions ample for general offices and a shop for light repairs and inspection, and (c) facilities for spotting cars into and out of storage and inspecting them in the yard without the use of the usual ladder tracks, for which no space was available.

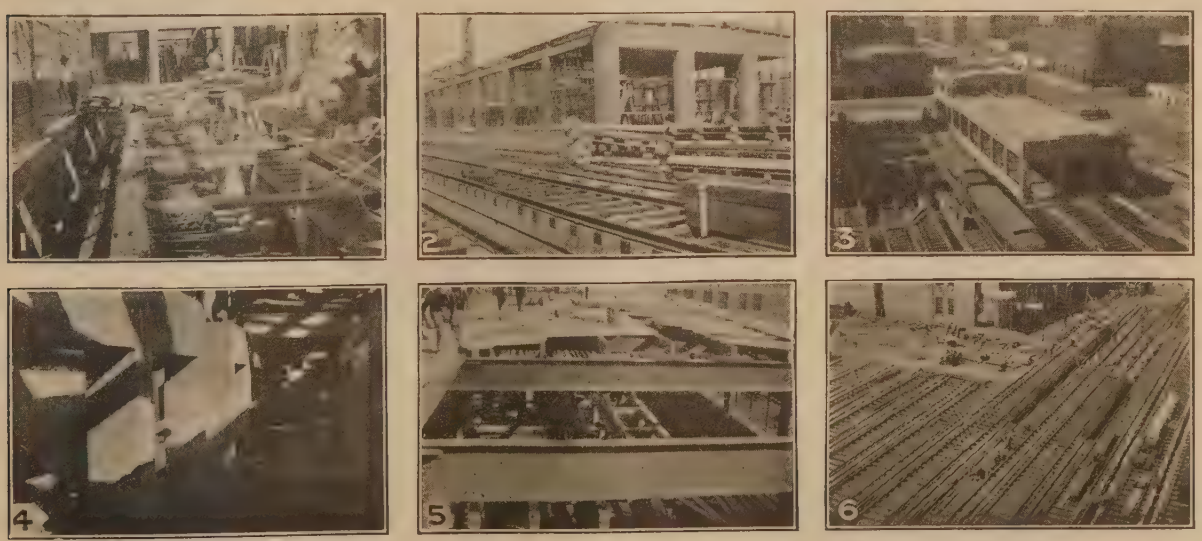
2. The complication of conduit and slot construction had to be reduced to a minimum in order to save cost and facilitate upkeep.

3. Provision had to be made for preventing tidewater from getting into the plumbing, the elevation of the site being low with respect to the high-tide water level.

4. Costs had to be kept down to the limit.

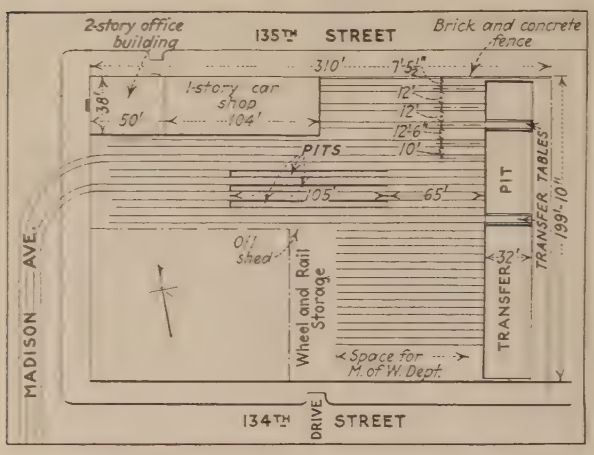
How these four specifications were met is explained in outline as follows:

The site consists of a rectangular southeast corner plot lying approximately 310 ft. along 135th Street and



CONSTRUCTION VIEWS OF ADMINISTRATION AND SHOP BUILDING AND YARD TRACKS, NEW YORK & HARLEM TRACTION LINES

No. 1—Pits in shop are provided by means of concrete beams and columns.
No. 2—Yard tracks are laid on concrete troughs.
No. 3—Liberal window space is provided in shop on north and south sides.
No. 4—Tracks over pits in shop are substantially supported.
No. 5—Shop roof is of mill type construction, supported on heavy I-beams.
No. 6—Even simplified conduit-track construction involves expensive supporting structure.



GENERAL PLAN OF NEW YORK & HARLEM RAILROAD PROPERTY, 135TH STREET AND MADISON AVENUE, NEW YORK CITY, SHOWING GENERAL OFFICE AND CAR SHOP BUILDING AND STORAGE AND INSPECTION CAR YARD

200 ft. wide at the rear. The frontage on Madison Avenue is 100 ft., a 100-ft. x 135-ft. plot on this front being owned by others. A space 28 ft. x 154 ft. was set aside for the building and the remaining space was laid out in tracks, transfer-table pit and materials storage areas.

The most capacious and economical track layout worked out was that shown in an accompanying illustration, with straight tracks and a transfer pit at the rear. This not only involved a minimum of special trackwork, especially desirable with slot construction, but at the same time it permitted the maximum of useful storage track.

The incoming main track and the adjoining two tracks were provided with pits more than 100 ft. long to permit routine inspection and obviate the transfer of cars to the shop tracks for trifling ailments. The main tracks were connected with those on Madison Avenue by means of A. E. R. A. standard spirals, so that standard turnouts can be installed in the street later if it is desired to connect up the company's tracks with the present tracks on Madison Avenue above 135th Street.

The transfer pit is similar in construction to that used elsewhere in New York City, but being in the open it had to be provided with ample drains through which snow can be flushed away. In these drains, as in the plumbing drains throughout, check valves were installed to keep out back water.

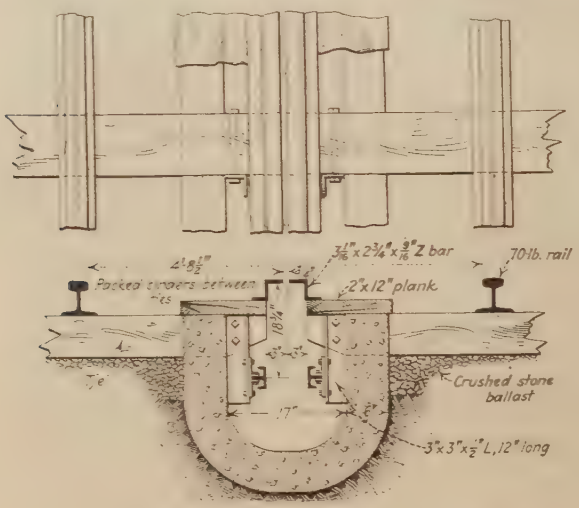
The really novel feature of this layout is the radical departure from usual practice made in the design of slot and conduit construction. While conduit railways in this country are confined to New York City and Washington, D. C., engineers will be interested in this detail as the solution of a complicated problem. It will be remembered that the main track rails and slot rails in this type of construction are mounted on heavy cast-iron yokes which are firmly supported on concrete. The contact bars are in turn mounted on insulators carried by the slot rails. A concrete conduit oval in form is molded to conform to the contour of the opening in the center of the yoke. Obviously such construction would be expensive and complicated in this crowded yard. Here is how its use was avoided:

Concrete troughs were constructed in the center of each track to take and protect the contact rails. The ends of the ties which extend across the devil strip and nearly half way across the gage were imbedded in these troughs. The spaces between the troughs were filled with crushed stone ballast, which assists in supporting the ties.

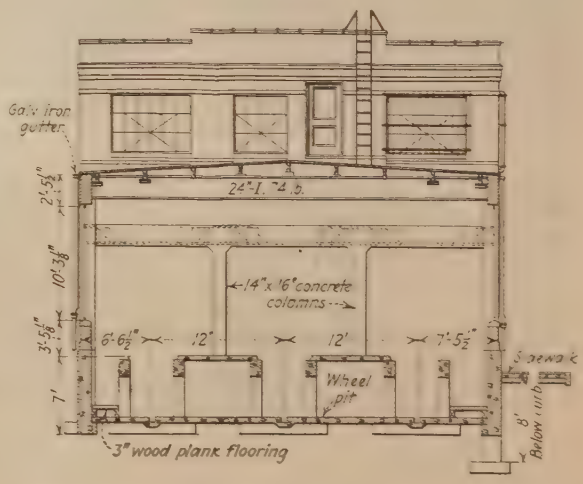
From alternate tie ends, extended for the purpose, the contact rails were supported by standard barn-type trolley hangers bolted to angle-iron brackets. Planks were spiked to the ties to protect the contact rails and support Z-bars which were spiked to them to form the slot. Some modifications in the construction were necessary on outside tracks and at the pits, as will be seen from the illustrations.

SIMPLICITY A FEATURE OF SHOP AND OFFICE BUILDING

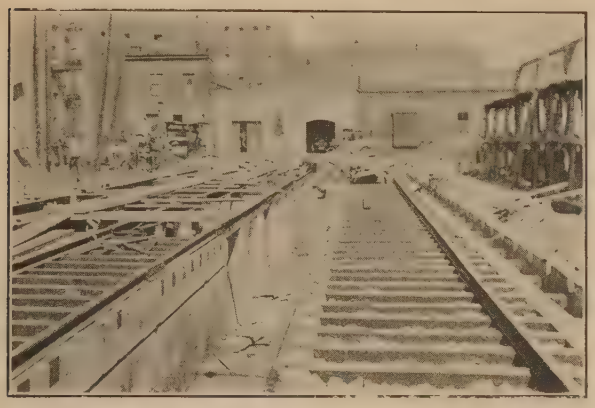
Coming now to the building, it will be noted from the illustrations that it is of mill construction. This was used to avoid brickwork and to utilize standard sizes of steel sash. The main floor is on two levels, the front building being set high to minimize excavation and provide good light for the basement. The details of the building floor layouts are given in the line drawings reproduced, and need not be elaborated here. Suffice it to say that the layout has proved to be just what the management needed for administrative work, and the



DETAILS OF CONDUIT CONSTRUCTION IN SHOP AND YARD. CONTACT RAILS SUPPORTED FROM TIES



CROSS-SECTION OF CAR SHOP, SHOWING BUILDING AND CERTAIN CONSTRUCTION DETAILS



VIEW IN YARD SHOWING CONSTRUCTION FOR SUPPORTING TRACK AND PROVIDING CONTACT-RAIL SUPPORT

manager can overlook, from the second floor, the operation of the cars in street and yard.

In the shop there are the standard facilities for changing wheels, armatures, etc. A photograph has been reproduced to show the method used for handling and storing armatures. Another shows a four-wheel trolley which is used for power supply to the cars in the shop. It is made of ordinary trolley wheels carried on a light frame, and rolls on angle-bars hung on barn-type insulators from crossarms. These bars also serve as a source of power for lights, etc., the simple two-wheel trolley shown in the illustration being used as the contact device for this purpose.

One end of the shop space is reserved as a machine shop, where simple tools such as drill press, emery wheel, etc., are provided. One-half of the floor space is occupied by pits under the three tracks. The pit construction consists of heavy concrete longitudinal beams cast solid with the columns.

The work was done under the general direction of H. L. Pitner, engineer of way and structure, with the co-operation of J. F. Uffert and W. B. Uffert of the equipment department. James Stewart & Company were the contractors for the building.

A Handy and Effective Welding Shield

FOR a welding shield to protect pedestrians from the glare of the electric welding arc, the Milwaukee Electric Railway & Light Company has devised an ingenious box to displace the more common fence-type shield. This box shield is made of ⅜-in. asbestos board and is about 8 in. wide by 8 in. deep by 24 in. long with an open bottom and a slot in the top extending the full length along one side. The opening in the top is sufficient to permit a free manipulation of the metal electrode which is inserted through the opening into contact with the point at which it is desired to build up the metal. The box does not cut off the operator from a free circulation of the air as the old type shield does. It is deep enough to prevent the glare of the arc reaching onlookers, and as it is equipped with a handle it is very readily picked up and carried from one welding point to another.

WELDER USING ASBESTOS BOARD BOX AS A SHIELD

Don't Lose Sight of Money Invested in Maintenance Materials

Shop Forces Accustomed to Seeing Large Quantities of Material in Storage Seldom Realize Its Value and May Become Wasteful and Inefficient in Applying It

SOME of the advantages of a perpetual inventory or stores control are pointed out in a bulletin just issued by the Fabricated Production Department of the Chamber of Commerce of the United States.

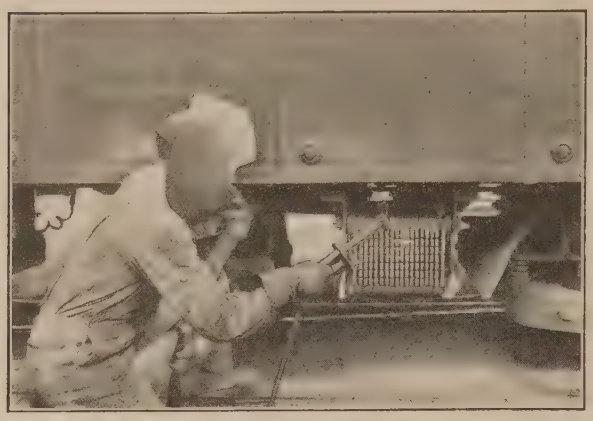
When capital, says the bulletin, is in the form of cash it is carefully protected, its receipt and disbursement safeguarded, its custodians held to a strict accounting, but once this capital is converted into materials there is a tendency to become lax, to lose sight of the value of the investment, to husband the capital less diligently, to tolerate practices that are wasteful, inefficient and needlessly expensive.

There is something at fault with business methods when material is purchased far in excess of requirements, when material becomes obsolete before it is needed, when material is not protected or kept accessible for use and when foreman and workmen help themselves without authorized requisitions or when material is consumed without any record for cost purposes.

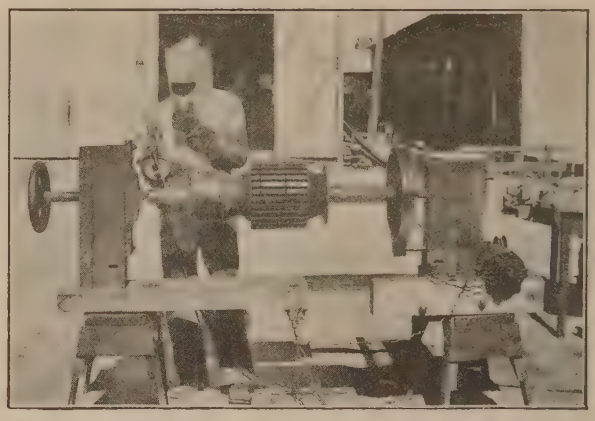
An efficient stores or perpetual inventory system, and that alone, will provide: (1) Sufficient material to meet requirements so that production shall at least not be checked by a lack of necessary material; (2) a minimum investment in inventories which is of supreme importance at the present time; (3) an orderly and accessible arrangement of material and the physical safeguarding of material from the elements and theft; (4) the elimination of the burdensome and inaccurate annual physical inventory; (5) a monthly closing by giving the amount and value of material on hand at any time; (6) an invaluable record in case of fire loss, and (7) a safeguard against the accumulation of obsolescent material.

The control of material does not end with the storeroom or its record; to a large degree the success of a stores control system will depend on the co-operation of foremen and workmen. In particular the foreman can directly help the control of materials by avoiding congestion in the departments, by protecting material in the departments against breakages and thefts, by assisting in the proper distribution of material to their men, by seeing that the men get the quantity of material ordered, by ascertaining that material is skilfully handled in the departments and when processed that it is promptly and properly transferred.

The little waste, a nut here, a bolt there, each inconsequential in itself, is serious in the aggregate. The foreman can effectively co-operate by husbanding the consumption of such material, the requirement for which can only be estimated and not always expressed with exactitude. These include supplies such as oil, waste, paint, greases and solder, and fittings and fastenings such as bolts, nuts, screws and rivets.



WELDING RESISTOR GRIDS WITHOUT REMOVAL FROM THE CAR



EARLY EXPERIMENTAL TYPE OF WELDER USED IN SAN ANTONIO

Arc Welding in Railway Shops

Repairs to Rolling Stock Equipment Can Be Frequently Made Without Removal from Cars So that Large Savings in Both Labor and Material Result

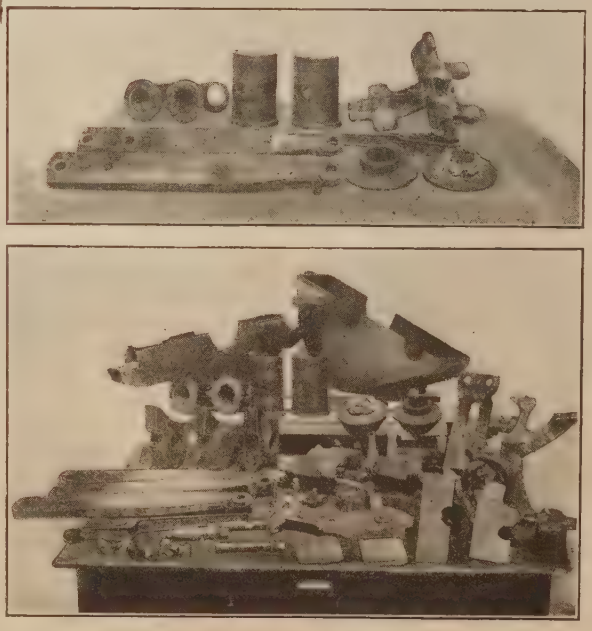
BY S. E. MASON
Superintendent of Equipment San Antonio (Tex.) Public Service Company

ELECTRIC welding in the shops of the San Antonio Public Service Company began in October, 1918, with a home-made electric welder of the resistance type giving a variation of from 77 to 200 amp. in five steps across the trolley supply, as shown in an accompanying schematic diagram. This machine was superseded by a motor-driven 175-amp. electric arc welding equipment in September, 1920. Since then we have evolved a routine of reclamation of parts of electric car equipment which is showing a handsome return over and above its operating cost and investment charges. This property serves a city of 165,000 population and operates a total of 175 passenger motor cars over 95 miles of track. Of these cars ninety-six have single trucks and the remainder are heavy double-truck cars.

Our records show that by the use of the electric welder we have saved an average of $1,308.13 a month. This makes an annual saving of $15,697.58, which we believe is a wonderful return on the investment, as the single-operator unit cost us approximately $1,000 installed. In other words, the outfit has more than paid for itself every month. I am sure that the actual figures as taken from our records will be of considerable interest to other railway companies. These figures are given in the accompanying tabulation. An explanation of the headings of the columns and the method of obtaining the various information is necessary to check the correctness of the figures. The "Per Cent Condition After Weld," second column, indicates the per cent of life expected after repairs by electric welding, the life of a new article being considered 100 per cent. It will be noted that in some instances the per cent condition after welding is above 100. The explanation is, for instance, in the case of clevises and pull rods, that the method of welding adds qualifications not found in the original article, due to the introduction of a small per cent of carbon into the molten weld, thereby case-hardening and resulting in a longer life than could be expected from a new part.

The welder's time in making the weld (column 3), the machinist's time in machining the weld (column 4), and the materials used (pounds of welding iron, column 5) combine to give the total cost of reclamation (column 6), neglecting current and overhead. Column 7 shows the cost of the new part. The saving indicated in column 8 is found by taking into consideration the per cent condition after welding. The number of parts repaired per average month (column 9) multiplied by the saving on each part shows the saving per month (column 10).

A large saving of $207.48 is credited to "changing core" and "per cent winding saved" in labor and material. It is interesting to



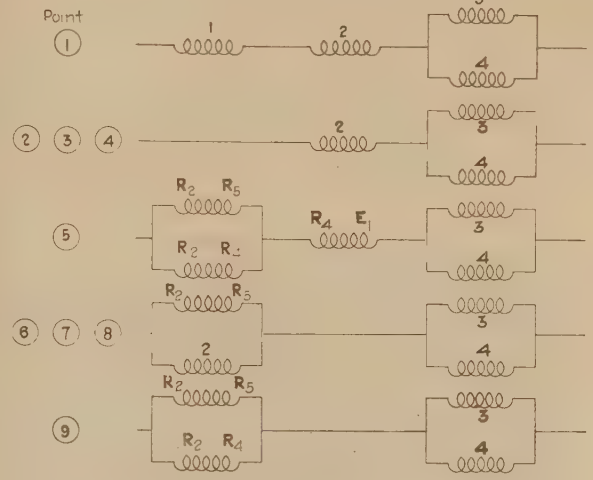
SAMPLES OF REPAIR BY ELECTRIC WELDING
These groups of articles repaired by electric welding represent five different classes of metals.

note how this is accomplished. In welding worn journals or armature shafts we remove the complete armature and place it in a lathe. The metal electrode is then placed in a position corresponding to the tool chuck and the armature is revolved. The electrode deposits the necessary metal on the shaft very evenly in spiral form. After the metal is deposited, the electrode is removed, a tool is inserted and the shaft journal bearing is machined to the proper diameter. This eliminates the necessity of removing the core or winding from the shaft and therefore is properly credited to the saving in welding. This method of spiral application was evolved after we experienced trouble with warping of shafts when placing metal back and forth parallel to its length. It also makes a much smoother finish as it is comparable to machine welding.

The machine shown in the illustration with the welder building up the armature shaft is one we used in the earlier experimental stage, and although it has considerable merit, it is limited in its possibilities. The present machine is located in a narrow space and is inaccessible for photographing. This new machine has a shop-made lathe especially adapted. Another illustration shows a close-up of a spiral weld on an armature shaft.

We recently had an accident with a 10,000-kva. turbine due to the dropping of the spindle which cracked the lower half casting of the front turbine bearing. This was readily welded by bringing in the electric arc welder from the carhouse. Because of the small tolerance between the moving and stationary blades, other methods of welding would have undoubtedly caused warping to such an extent as to be inadaptable; further, preheating necessary to other welding methods would have been practically impossible.

The illustration of a welder repairing a broken grid without disturbing the resistor demonstrates how repairs may be made on broken parts without removing them from the car. In this case cost of labor to remove,



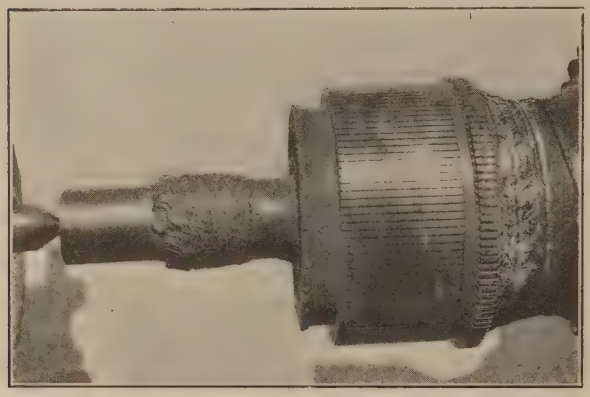
SCHEMATIC DIAGRAM OF CONNECTIONS FOR EARLY RESISTANCE TYPE ELECTRIC WELDER

Point	Volts	Ohms Resistance	Amperes
1	525	6.780	77
2-3-4	525	4.068	129
5	525	3.842	136
6-7-8	525	2.917	180
9	525	2.625	200

Article reclaimed	Per Cent Condition After Weld	Welder's Time, Hours	Machinist's Time, Hours	Material, Pounds	Total Cost	Cost New	Saving	No. Used per Month	Saving per Month
Worn gear and wheel seats on axle	80	6	4	5	$9.75	$27.52	$10.02	2	$20.04
Worn journals on armature shaft	95	5	4	4	8.42	17.50	8.21	6	49.26
Changing core, etc.	100					3.43	3.43	6	20.58
Per cent winding saved	80					119.20			
						M.32.72	31.15	6	186.90
Brake shoe heads No. 136666 caps	80	2	2	3	4.11	5.45	1.35		
Swivel for trolley base	90	1½		1	1.94	9.66	6.75	2	13.50
No. 119763 pole socket body for trolley base	90	3	1	1	3.66	7.44	3.04	1	3.94
Swing link bottoms	90				0.54	1.22	0.56	5	2.80
Clevices and pull rods	110			1	0.65	5.00	4.85	1½	7.28
Worn key way in armature shaft pin seat	85		3	1	3.44	17.50	14.88	2	29.76
Thrust 512-A armatures	80				1.67	4.09	1.60	3	4.80
Thrust 200 armatures	80			1	1.67	5.40	2.65	2	5.60
512-A thrust rings	95			1	0.86	2.11	1.14	10	11.40
GE-54 thrust collars	95			1	0.86	5.11	3.99	15	59.85
K-28 check pawls	80				0.43	0.59	0.04	2	0.08
27-G1 side bearings	100	1			1.50	3.09	1.59	5	7.95
GE-54 dope cuplids	90				0.43	0.13	0.31	4	1.24
M-33 door castings	90				0.86	1.54	0.53	1	0.53
1171-F door castings	90				0.43	1.45	0.88	3	2.64
4767 door castings	90				0.43	1.68	1.08	1	1.08
1106-M door castings	95				0.64	5.19	4.29	3	12.87
Step casting levers	85				0.29	0.76	0.36	12	4.32
Draw bar carriers	90				0.43	2.36	1.69	1	1.69
Space block for equalizing spring	80				0.64	3.85	2.44	8	19.52
4387 brake head shoe bases	100			3	1.32	3.86	2.54	1	2.54
Light load coil spring seat	80			1	0.65	2.43	1.29	½	0.32
AS-956 seat arms	95				0.29	0.62	0.30	1	0.30
AS-962 seat ends	100				0.65	0.80	0.15	1	0.15
Seat supports	100				0.43	0.67	0.24	1	0.24
Dowel pin holes in axle bearings	85			½	0.98	9.13	7.76	6	46.56
Hinge on gear case lids	95				0.43	0.75	0.29	3	0.87
Lug on trolley catchers	80				0.49	1.54	0.74	1	0.74
K-12 controller cap	80			½	0.91	4.69	2.84	1	2.84
K-12 controller frame	80	3		1	3.58	25.00	16.42	¼	4.10
GE-54 armature bearing dust covers	110				5.68	5.54	0.41	40	16.40
Bore of 512 axle gear	50	4	4	3	7.55	31.69	8.30	1/12	0.69
Axle bearing caps, dowel pins, 92-A-512-A GE-200	85				0.93	6.62	4.70	3	14.10
Patch gear case halves 54-92-A-512-200	75	1		2	1.11	18.62	12.85	45	578.25
Journal boxes	95	1		1	1.86	9.00	7.69	1	7.69
Air valve stems	100	1			1.59	4.20	2.61	15	39.15
Enlarged hinge pin holes in brushholders	80				0.43	5.34	3.84	10	38.40
GE-54 top motor case	95	5		2	4.74	49.31	42.10	⅓	21.05
Build up armature core key	50		1		1.59	52.69	24.75	1	24.75
Build up commutator shell seat	50	2	2	1	3.55	17.50	5.20	1	5.20
Weld loose farebox brackets	95				0.21	0.86	0.61	10	6.10
Drill shanks (average ½)	50				0.43	1.47	0.30	6	1.80
Broken truck braces	90	3		25	4.05	4.37	10.30	1	10.30
Resistance grids	100	1/12			0.07	0.51	0.44	7	3.08
Air reservoir	100	2			1.83	13.23	11.40	¼	2.85
Standard brake shoe heads	75	1			0.97	2.44	1.47	0	13.23
									$1,308.13

dismantle and reassemble the resistor is much higher than the material costs. The method used not only saves in material costs but the major portion of labor costs is saved as well. A few of the typical reclamations of parts worn, welded and machined are shown in two other illustrations. Five different classes of metals are shown in these groups.

Each method of welding assuredly has its particular field and the success of the finished job depends upon



A SPIRAL WELD ON AN ARMATURE SHAFT

the judgment of the welding engineer as to whether the thermit, electric or oxyacetylene process should be used. However, there is no type of welding that has as wide a range as the electric, which can be adapted to almost any job, irrespective of size or metals, and as for speed, costs and quality of finish, it is without an equal.

Maintenance Kinks from Little Rock

W. H. CURTIS, master mechanic Little Rock Railway & Electric Company, has rigged up a number of ingenious devices which help the repair work done in the shops of that company. One of these is an air brake valve grinder. Formerly these valves were ground by hand and the process took about an hour and a half. Now they are ground by electric power in about thirty minutes and the machine requires no attention while the valve is being ground. The valves to be ground are bolted to the vertical side of the work bench, and the grinder, which is of the kind used for grinding automobile valves with a rotary motion but with reversing movement, is set in an adjustable frame over the valves to be ground. The grinding machine is then driven by a small electric motor through a wooden pulley and belt.

Another adaptation of electric drive to work formerly done by hand is the winding of resistances for type E air governors. In this case an old sewing machine frame is used for the frame of the winding machine. It is driven by a former fan motor which is belted to the shaft of this improvised winding lathe. A resistance spool can now be wound in ten minutes instead of in an hour and a half. The fact that the shops are equipped with 110 volts permits the use of the fan motor without resistance.

Like many other shops in the country, those at Little Rock make extensive use of electric welding in repair work. During a recent visit to the shop by a representative of this paper, Mr. Curtis pointed out a pile of brake shoe heads whose center and end seats had been built up by arc welding. The practice results in a saving of about $1.50 per brake shoe head over a new head or a saving of about $350 a year, as 200 new heads otherwise would have to be purchased.

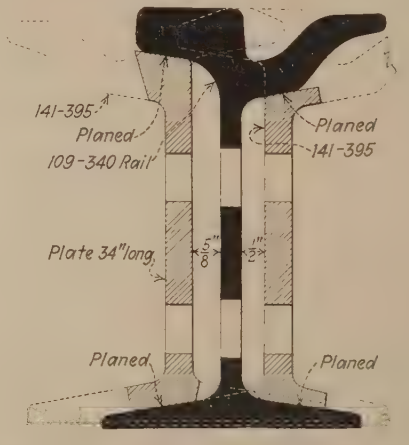
Some time ago the company changed over the method of armature shaft and motor journal bearing lubrication of some of its G.E.-57 motors so as to decrease the amount of oil used and increase the period between oilings. The plan followed was simply to increase the size of the oil wells by welding on top of the well a section about 4½ in. long of square shaped boiler tube about 3 x 3 in. The tops of these enlarged oil wells are then fitted with the usual spring cap. This method was described in the ELECTRIC RAILWAY JOURNAL for May 7, 1921, page 861, and now the motors on ten cars have been fitted in this way. The oil well is packed with waste and its enlarged capacity for oil enables a car to run for ten days or 1,000 miles without reoiling. Then less than a gill is required per bearing.

The company is still using sheet metal ceilings in its cars and finds them cheaper in first cost and maintenance than veneer, the material formerly used.

Worn-Out Rails Cut Down to Make Joint Plates

THE Market Street Railway, San Francisco, has recently made up about 100 pairs of joint plates from worn girder rail that had been taken out of service to be scrapped. By a comparison of cross-sections it was found that joint plates suitable for 109-340 (Lorain) rails could be cut from the 141-395 (Lorain) rails that had been worn out on this system.

The shaded sections on the accompanying illustration represent the portions of the old rails utilized and the solid section represents the 109-340 rail on which they are used. Each plate consists chiefly of the web from the worn rail from which parts of the base, ball and lip have been cut away with the oxyacetylene torch. Four oxyacetylene cuts are required, two on the head and two on the base, to make each plate. With the piece



SECTIONS SHOWING HOW PARTS OF SCRAP RAIL ARE USED FOR JOINT PLATES

roughly cut out in this way, two surfaces on each plate are planed to insure exact size and smooth fit against base and ball of rail respectively. The bolt holes in the web are then drilled in the usual way.

This method has been found to provide joint plates of very good quality at low cost. The plan was worked out by W. D. Chamberlain, assistant chief engineer Market Street Railway.

Installing Shallow-Conduit Construction in Washington

The Capital Traction Company Uses a Large Number of Pneumatic Tools in Replacing the Old Type of Deep Tube Cable Construction with New Shallow Tubes

BY D. E. DUNN
Ingersoll-Rand Company, New York, N. Y.

TRAFFIC CONTINUES THROUGHOUT THE OPERATION

MOST electric railway men are more or less familiar with the underground conduit track construction used in Washington, D. C. But probably very few, except those who have actually worked on this type of construction, realize the difficulties of excavation on renewal work of this kind without interfering with car operation.

The Capital Traction Company of Washington, D. C., has been very busy the past few years renewing completely the old deep tube cable road construction which was installed in 1891-1892. As its name implies, it was a cable road, so operated until 1898. During 1898-1899 the entire system was electrified, the conductor bars being placed in the same tube that was used for cable operation.

In 1901 several extensions were built and a shallow tube construction adopted as standard. This type has a yoke spacing of 5 ft., which did not allow of its being used for renewal of cable construction. The result was that a new type of shallow tube construction was designed with a yoke spacing of 4 ft. 6 in., which has since been used for complete renewal of the old deep tube cable work.

The old tube concrete was a 1-2-4 mixture, using 1-1½-in. crushed stone as aggregate. Needless to say, it was, and still is, hard concrete. Even after the twenty or more years since it was installed and subjected to heavy car traffic day after day it is still in first-class condition. During excavation work it is a common sight to see the stone itself split rather than the bond give way.

Prior to 1917 all excavation work was done by hand, using a 1¼-in. round steel to a depth of a few inches and then splitting off the concrete with 3 in. square bull-points. There was not a great deal of renewal work in those days, and labor was cheap, so that method answered very well.

However, in 1917 the company purchased its first portable air compressor, an Ingersoll-Rand Imperial XII machine and two "jackhamer drills." These tools did excellent work, so the following year two tie tampers were purchased, not, however, to tamp ballast, but to be used with chisel bits for cutting out the asphalt pavement, trimming out yoke holes, etc.

In 1919 an outside contractor rebuilt some track and brought with him a home-made portable compressor, consisting of four car compressors and four tanks, mounted on a low-wheeled truck. The Capital Traction Company purchased two more "jackhamer drills" for that job, taking them over when the contractor had completed his work. He, of course, took his compressor back with him, so the railway then had on hand several more tools than it had air equipment to operate them.

In 1920 the railway built two compressors similar to the one the contractor had, and then purchased three more tie tampers. These additional compressors and tools proved very satisfactory, so in 1921 another compressor was purchased. This was a Westinghouse Traction Brake Company's type E-4 machine, and to date eight Ingersoll-Rand type CC-25 concrete breakers and two Little David sand rammers have been added to the equipment.

The first two of the concrete breakers were received on March 28, and they proved so satisfactory that the "jackhamer drills" and tampers were gradually replaced with the CC-25s. These tools are just what their name implies—concrete breakers, in every sense. One wonders, while watching them in use, how people ever got along without them in the years past, particularly in excavation work such as is necessary in Washington.

The first complete rebuilding job of any extent was Pennsylvania Avenue from Second Street to Seventh Street, Northwest, in 1912. The following year Pennsylvania Avenue was rebuilt from Ninth Street to Fif-

Removing Asphalt Pavement and Concrete Tube

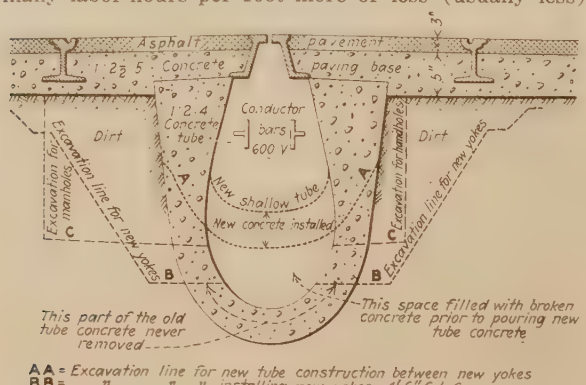
No. 1—First stage of reconstruction after asphalt is removed.
No. 2—Operators loosening and breaking up concrete tube.
No. 3—Cutting away asphalt with tie tamper.
No. 4—Removing concrete by the hand method. Gang consists of three strikers and one chisel holder.

No. 5—Working in close quarters with a pneumatic tool. The wooden paddles shown are used to safeguard the worker, so as to make certain that the tool does not come in contact with any live parts of the conductor bars. In operation one workman holds the paddle between the conductor bars and the tool.

teenth Street, Northwest. Costs per foot of track were carefully watched and compared from day to day, and it was thought at the time that these jobs were very economically completed, and, until about 1916, they were used as a basis for comparison on complete rebuilding jobs.

But owing to varying wage scales, a fair comparison was hard to obtain without a great deal of work, as the only way to obtain the actual man-hours expended was by going through all the time books and picking out the labor on each phase of the work. Even this would not have been very accurate.

In 1919, however, this company instituted a new system of cost keeping, which is all that could be wished for. Not only are the actual costs kept on every phase of the work, but also the labor-hours, foremen and laborers being separated. Thus, no matter what the wage scale, a comparison of labor-hours per foot of track is always available, and this is really what is wanted. The railway officials now speak of a job as requiring so many labor-hours per foot more or less (usually less) than the preceding job, instead of costing so much more or less.


Asphalt pavement
1:2½:5 Concrete
paving base
1:2:4 Concrete tube
Conductor bars 600 V
Dirt
Dirt
Excavation for manholes
Excavation line for new yokes
Excavation for manholes
Excavation line for new yokes
New shallow tube
New concrete installed
C
C
B
B
This part of the old tube concrete never removed
This space filled with broken concrete prior to pouring new tube concrete
AA = Excavation line for new tube construction between new yokes
BB = " " " installing new yokes, 4'-6" C. to C.
CC = " " " insulator boxes, 15'-9" C. to C.

CROSS-SECTION OF TUBE CONSTRUCTION, SHOWING EXCAVATION NECESSARY FOR RENEWAL WORK

By digging through many old-time books, a fair average hourly wage for the excavation gang during the years 1912-13-16-17 and 1918 has been obtained and, knowing the cost per foot of track of excavation on the various jobs, the approximate labor-hours per foot have been computed.

The accompanying table gives such data and also the number of air tools available at the time the various jobs were under way. These figures are for excavation only, and do not include any costs of hauling excavated material away from the jobs:

LABOR COSTS AND HOURS PER FOOT OF SINGLE TRACK FOR EXCAVATION ONLY, AND AIR TOOLS AVAILABLE AT THE TIME

(Figures include excavating through paving base on one-half the dummy)

Year	Per Ft. Cost	Single Track Hours	Air Tools Available for use
1912	$1.81	10.45	None
1913	1.56	9.12	None
1916	1.33	7.10	None
1917	1.62	7.08	Two "jackhamer drills"—50 per cent of the time
1918	2.47	7.49	Two "jackhamer drills"—Two tie tampers
1919	3.30	8.08	Two "jackhamer drills"—Two tie tampers
1920	3.49	7.78	Four "jackhamer drills"—Six tie tampers
1921	1.70	4.46	Two to six concrete breakers—Two tie tampers

Figures don't lie; therefore, according to the foregoing table, air tools did not effect any saving until this year. But, stop to consider the quality of available labor during the war, the heavy increase in car traffic, and numerous other conditions that made this sort of work much more difficult, and then wonder that the labor-hours did not almost double.

This year, however, labor has improved in quality, and certainly in quantity, and the CC-25 concrete breakers made their debut; the result is a decrease of about 40 per cent in the cost of excavation on this work.

So far, the discussion has been confined to straight trackwork. Needless to say, pneumatic tools are even

Replacing Rails and Loosening Earth for New Construction

No. 6—Machine method facilitates chipping off boltheads.
No. 7—Hand method of chipping off boltheads previously used.
No. 8—Special tongs used to lift large chunks of concrete after they are broken off by the paving breaker.
No. 9—Tie tamper equipped with spade point loosening compact earth.
No. 10—Hand method of loosening dirt which has been replaced by machine methods.

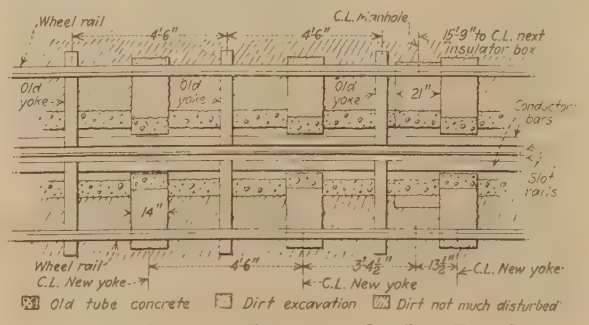
of greater value in excavating for special trackwork renewals, where the concrete is much heavier and much more difficult to remove.

Several small tools, such as scoop-shaped hoes, tongs for large lumps of concrete, etc., which are made in the railway company's shops, have also materially aided in removing the broken concrete from the bottom of the tube and have helped to reduce the costs of excavation.

The accompanying illustrations will give a rather complete idea of the extent and nature of the excavation work recently carried out at Fifth and G Streets. By referring to the cross-section of the tube construction, it will be seen that in order to provide for the new shallow tube, it is necessary to remove asphalt pavement, concrete paving base, and a large part of the old concrete tube. In order to provide for manholes and new yokes, it is also necessary to excavate and remove a considerable amount of dirt outside of the concrete tube. In such reconstruction the first work is the removal of the asphalt pavement.

For breaking up the asphalt two air-driven tools were used, first a pneumatic tie tamper, which was later discarded in favor of CC-25 paving breakers. An Ingersoll-Rand 6-in. x 6-in. type 14 portable gasoline-driven compressor outfit will furnish sufficient air to operate two paving breakers working continuously. The crew for such a job consists of three men, one compressor man and two operators. It is usual for the compressor man to be in charge of the crew and he relieves the operators from time to time. In order to confine the removal to definite lines so that there is no waste from removal of material not required, the first operation is what is termed "marking" the asphalt. This operation consists of driving the chisel bit through the entire thickness of asphalt at intervals of about 3 in. to 4 in. along a line which is to mark the extent of the asphalt to be removed. At the point where the removal of asphalt is to commence the end is also marked. The chisel is then driven nearly vertically through the full thickness of the asphalt and it is then slid along under the asphalt so as to break it up into pieces about 12 in. x 18 in. The asphalt is practically "peeled" off the concrete base by this operation. The broken pieces of asphalt are removed by hand and are piled up out of the way for removal. The paving breakers are rugged, all steel machines, the principal parts being drop forgings, so as to stand severe usage and hard work. The chisel used for marking and breaking up the asphalt pavement has a width at the cutting edge of 3 in.

The next work consists of the removal and breaking up of the concrete paving base, which averages from 5 to 6 in. in thickness. A moil point steel tool is substituted for the chisel in the paving breaker. This is driven through the concrete sub-base at about the middle of the trench. This spalls off an irregular V-shaped piece. Then two or more cuts are made, which remove the remainder of the concrete along the line. Chunks of considerable size are thus broken off, and in order to facilitate the handling of these the Capital Traction Company has made some tools which consist of tongs that will grip the chunks of concrete and which have handles so that the lumps can be handled by two



PLAN VIEW OF COMPLETED EXCAVATION, OLD DEEP TUBE CABLE CONSTRUCTION REPLACED WITH STANDARD

men. An accompanying illustration shows this process. Also for comparison illustrations are given showing the removal of concrete by the old hand method where a gang of three strikers and a chisel holder were necessary to break off the concrete. The saving to be gained from employing machines over hand methods on similar work in track where there was no conduit slot to contend with is illustrated by the fact that a man with a paving breaker averaged 14 cu.ft. per hour, while with the hand method the rate per man per hour was but 2⅓ cu.ft.

Following the gang which breaks up and removes the concrete is another which chips off bolt heads and cleans the concrete from the face of the rail. Two men perform this work, one for each rail, and they each operate a 56-H Little David pick. The same compressor which is used for two paving breakers will operate two of these Little David picks. This would seem to overload the compressor, but such is not the case, as all of these tools operate intermittently. The same tools are used to remove the concrete which adheres to the rails. An accompanying illustration shows the old method of chipping off boltheads by hand. After removing the concrete and in order to provide sufficient excavation for installing new yokes and for manholes and handholes, it is necessary to loosen and remove some dirt. The soil is very compact, and for loosening this old tie tampers equipped with spade-pointed steel tools are used.

CLOSE-UP VIEW OF OPERATION OF LOOSENING COMPACTED SOIL WITH SPECIAL SPADE POINTED STEEL TIE TAMPERS

After the old yokes are removed from the roadbed new yokes are put in place and concreted in as shown in the accompanying drawing and the street is finally repaved with asphalt. The actual amount of material excavated varies from 35 to 40 cu.yd. per 100 ft. of single track including one-half the dummy, about 25 cu.yd. of which is concrete. The Capital Traction Company now has about $10,000 worth of portable compressors and pneumatic tools, and the officials consider this a very profitable investment.

Obsolete Rail Saw Made Over Into Rotary Planer

SINCE the advent of the oxyacetylene process a Newton rail saw in the shops of the Market Street Railway, San Francisco, has not been used for the original purpose of cutting special trackwork, etc., and has been classed as obsolete equipment. The device is a power-driven circular saw designed for heavy duty and substantially built. It was found that with a slight modification the machine could be used for planing. It was, therefore, equipped with a new head and has been used to advantage in connection with the recently devised process of making fishplates from scrap rail described on page 448 of this issue.

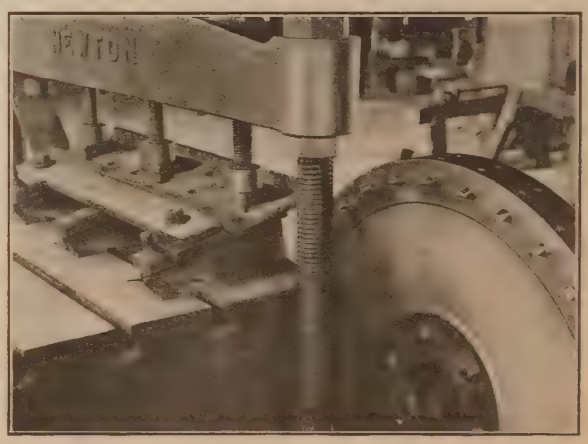
To adapt the old machine to this new service the circular saw was replaced with a 3-ft. circular head or wheel weighing about 300 lb., around the rim of which thirty cutting tools had been set. These tools, similar to those used on a planer, are set horizontally in holes drilled through the rim of the wheel and project from the wheel on the side away from the driving mechanism. Each cutter is held in place by two set screws, tapped in from the periphery of the wheel.

The driving mechanism and the feed are the same as used on the original machine with the exception of the drive pulley, which was changed so as to give a cutting tool speed of 45 ft. per minute. This is the linear speed of the cutting edges, which rotate on a circle 30 in. in diameter, and is the rate found most effective.

The bed plate or table on which the work is fastened is fixed, except for a slight lateral movement, to facilitate adjustment of the work in exact position. The mechanical feeding of the machine into the work is effected by an adjustable friction drive on the driving mechanism and can be varied between the limits of $\frac{1}{16}$ and $\frac{1}{4}$ in. per revolution. The machine is adapted only to cutting plane surfaces. Where beads or fillets are required the work is done on the ordinary planer.

The utilization of the old machine in this way was worked out by William Hendry, superintendent special-work shop, Market Street Railway.

GENERAL VIEW OF ROTARY PLANER, JOINT PLATE ON BED



CLOSE VIEW OF CUTTING HEAD, JOINT PLATE AT LEFT

Specialized Repair Forces Produce Better Track Maintenance

Milwaukee Company Way and Structures Department Has Some Employees Organized Into Gangs Assigned Steadily to Certain Kinds of Work—The Men Become Expert in Their Specialties—Some Maintenance Practices and Equipment Used Are Discussed

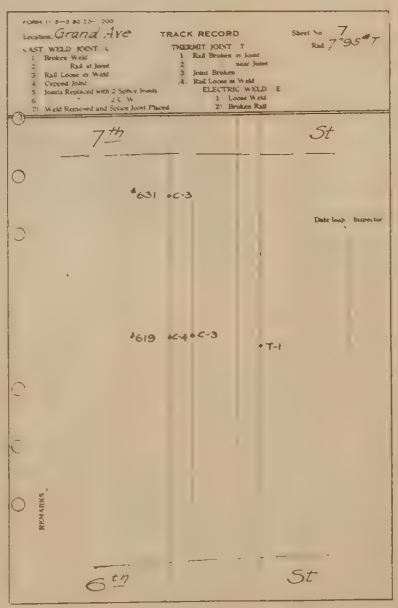
WELDERS BUILDING UP TRACK JOINTS. USING 100-AMP. WELDING MACHINE MOUNTED ON RUBBER-TIRED TRAILER

ROADMASTERS of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., are relieved of much specialized repair work incident to the general track maintenance, for the tendency of the way and structures department has been to separate those jobs requiring special experience and tools from the general run of trackwork. Under the ordinary plan it is necessary for the roadmaster and many of his men to be somewhat Jacks of all trades, but by segregating such work as special trackwork repair, grinding, welding and bonding, etc., from the duties of the roadmaster, and assigning these to men who do nothing else, the plan tends to produce better efficiency in all of the work.

Following out this general plan, the company has maintained during the past year, a special trackwork unit, a grinding, electric welding and bonding unit, cast and thermit welding unit, and an equipment maintenance group in addition to the general trackwork forces and the construction forces. Two or three general construction foremen take full charge of all major construction jobs and leave the roadmaster and his forces and the specialized units free all the year around to do the maintenance work.

The special trackwork repair unit consists of a foreman and five or more men who are equipped with an air compressor, various air tools including a hand grinder and air tampers, a full equipment of electric spike hole borers, spike drivers and track drills, acetylene cutting outfit, a dynamotor electric welder, special wrenches, and other tools incident to making special work repairs. The men in this unit are trained for the particular line of work and they operate independently of the general maintenance organization. Working continually at this one line of work, these men become very expert at fixing up worn special work to secure the maximum life before replacement. They also naturally handle this work more expeditiously than men who handle such work only now and then. Furthermore, it would be obviously impractical to provide the general maintenance gangs with as complete an outfit of tools and equipment.

Another maintenance unit working independently of the roadmaster's forces is engaged throughout the year on the grinding, electric welding and bonding work. This unit is made up of twenty-two men, who have been picked for their competency in doing any of the work involved in grinding, electric welding and bonding, as these different operations go together much of the time. This unit has six grinders at its disposal, including an Atlas grinder, a Goldschmidt thermit grinder, a reciprocating grinder and a Universal grinder. In construction and reconstruction work, the joints are frequently rough ground with the rotary type grinders and finished with the reciprocating type. Very little corrugation grinding has been found necessary in Milwaukee. The amount of grinding which is regularly handled by this repair



FORM USED BY FIELD MEN IN REPORTING BROKEN JOINTS
(Actual size 5⅛x8)

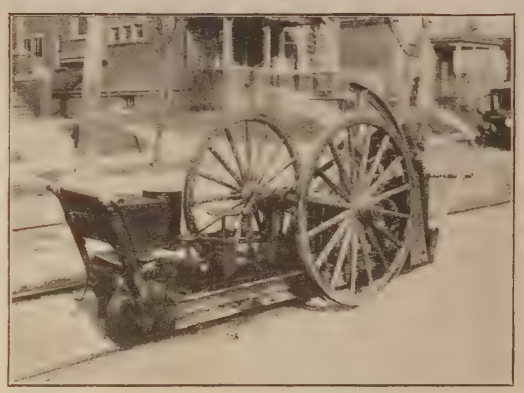
unit is indica'ed by the following record for a typical month's work.

	August
Joints ground	1,928
Frogs ground	42
Throatways	22
Mates	36
Switches	9
Total on special work	2,037
Corrugation	69 ft.

Of the total of twenty-two men in this maintenance unit, eight to twelve men are used for the major part of their time on the grinding work and for this reason are partly considered as a separate grinding unit, though some of these men are transferred when necessary to the welding and bonding work and they are therefore included in the total unit comprising the twenty-two men. There is another unit which divides its time in a general way between cast welding and thermit welding work, the size of the unit being increased by hiring additional laborers when cast welding is to be done. The Milwaukee Company is one of the few companies which have had good success with the cast-weld joint, some of these joints being twenty-three years old and still in perfect condition. Having had such good success with this type of weld the company will continue to use it in new work until convinced there is something better. The cast-welding equipment is also used to a considerable extent in maintenance work throughout the year.

MOTOR-GENERATOR WELDING OUTFIT MOUNTED FOR ROAD WORK

ROTARY GRINDERS USED TO REMOVE ROUGH SURFACE AFTER WELDING



RECIPROCATING GRINDER USED TO FINISH OFF THE RAIL AFTER WELDING

The thermit type of weld is used for compromise joints, special trackwork joints and under other special conditions. The electric process of welding joints has been used quite extensively, particularly during the last two years, in repairing defective joints. Altogether, the company now has some 55,000 welded joints of all types in service, and as the age of these joints varies from one to twenty-three years there is an annual requirement of about 2,500 welded joints to be repaired.

In the electric welding work the company makes use of two type W, 400-amp. welding machines supplied by the Rail Welding & Bonding Company, for welding joints and building up cupped rail; two type-B, 200-amp. Rail Welding & Bonding Company machines for bonding work, and one 200-amp. General Electric Company welding machine for top welding or building up work. Another G. E. machine has been ordered. It is impossible to draw an arc over ⅜ in. long with any of these machines. No resistance-type welders are used.

The experience in Milwaukee is that it takes considerable time to break in a man as a welder. His experience and skill are reflected in subsequent maintenance results, that is, in better work rather than in a greater quantity of work. This is therefore also one of the considerations which have led to the advisability of having certain men specialize on this class of work all year around.

In building up cupped joints, the Milwaukee company has been getting excellent results through the use of a welding rod which gives a finished weld somewhat harder than the rail. The welded metal has no tendency to chip out, and being harder than the rail it does not pound out. These rods are purchased in 36-in. lengths and ⅜-in. and ⅛-in. diameters, and have this composition: Si, 0.15 maximum; S, 0.04 maximum; P, 0.03 maximum; Mn, 0.30 to 0.60; C, 0.85 to 1.10.

A complete inspection of the entire system is made during each year, covering all joint failures. The field men are provided with a convenient form on which to record the location and nature of these failures, the form being so arranged that the information is recorded with very simple notations. A separate sheet is made for each block of each line. A typical report as sent in by a field man is reproduced herewith. The information printed at the top of the form gives data which are very effective in simplifying the record work of the field man and the location of failure is roughly indicated by placing a dot on the form at a position corresponding to the location of the joint in the block and on the particular rail.

The data thus obtained by the field men are transferred in the main office to a map of the city system drawn on a scale of 1,200 ft. to 1 in., so that one can tell at a glance at the map just where the bad spots in the track system are. This, of course, usually means the old track locations. The different types of defective welded joints are shown in different colors.

With this information on the map to go by, a nightly

SPECIAL TRACKWORK MAINTENANCE UNIT AND EQUIPMENT

SUPPLY FORD HAULS MATERIALS AND WELDING OUTFITS

program of repair work is readily laid out in groups of 30 to 40 joints so that the work of the repair force can be expeditiously accomplished without involving too great moving distances between points. The welders, cupola, thermit and electric, are preceded by a special gang, which removes the pavement around the defective joints, and closes the pavement after the joints have been repaired. This repair unit is equipped with air compressors, concrete cutters, tie tampers, and equipment and materials for mixing concrete and grout to fill up the pavement openings.

Each of the general track maintenance gangs is equipped with an oxyacetylene torch for cutting rail and one for use in bonding. Where these men make emergency repairs to a joint that is somewhat pounded down, or to a broken rail, they take out a piece of the rail by sawing down through the head and then cutting the rest of the way through the web and base with the torch, angling the cut back somewhat so that the head of the rail and the insert piece can be brought together with smooth surfaces in contact, perhaps using shims. When such a repair is made a bond is placed around the joint with the acetylene torch to carry the return current temporarily until this joint is permanently repaired.

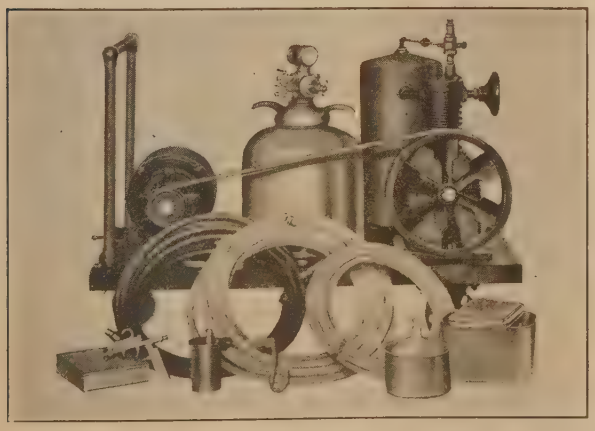
A third unit which specializes in certain work is under the direction of a supervisor of equipment. He has charge of all the power driven equipment of the way department, both as to maintenance and operation, except where a piece of equipment may be permanently assigned to a certain gang. Generally speaking, when any piece of equipment is needed, application is made to the supervisor of equipment, who supplies the machine required and an operator with it. He is also responsible for all maintenance work on all equipment wherever it may be in use and his men are picked for their special ability along this line. The extent of the equipment used by the Milwaukee company is very great, for money has been made available for the purchase of any machine that could show results in labor savings.

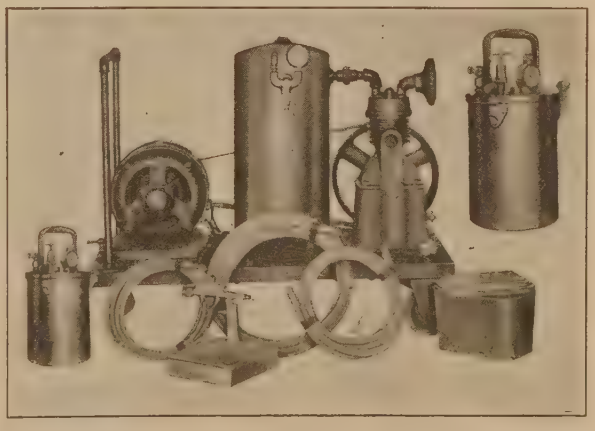
In all the interurban track and tie renewals, untreated Northern white cedar ties with tie plates are used. These are found to be the cheapest in annual cost, considering length of life and first cost when plates are used, for the failure of cedar ties is principally mechanical, due to rail cutting before deterioration takes place. Many of the cedar ties now in use have been in service for twenty years and are still good. Long leaf yellow pine ties are used in paved streets and white oak ties for special work.

New Portable Spray-Painting Equipment

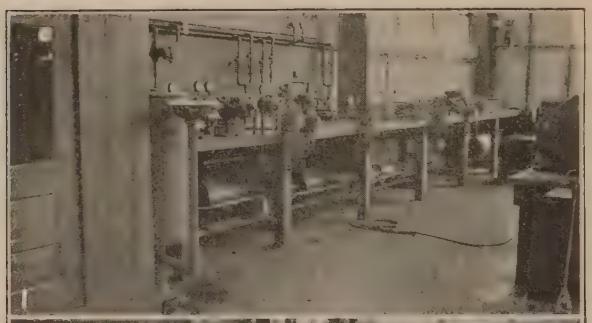
THE accompanying illustrations show two types of hand motor-driven spray-painting outfits intended for one-man operation. These are the products of the DeVilbiss Manufacturing Company, Toledo, Ohio, and are designed for maintenance work in shops which are provided with electric current. These outfits can be handled by a single operator. The smaller outfit, designated as TP-601, is furnished complete with a ½-hp. motor, compressor and air reservoir mounted on a portable platform truck. The complete equipment also includes a 1-gal. pressure paint tank and necessary hose.

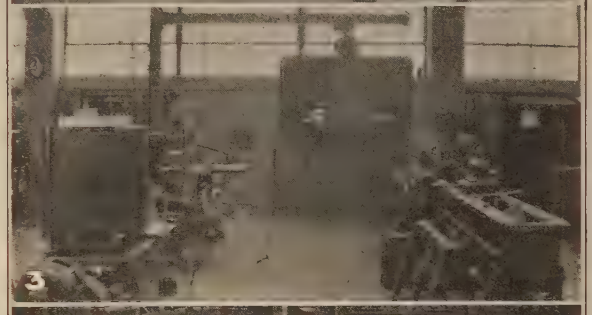
The larger outfit, designated as type TJ-601, has sufficient capacity to give a working radius of 100 ft. from the compressor to the paint tank and 25 ft. from the paint tank to the operator. A 7-gal. paint tank is furnished, together with extra lengths of fluid hose and repair parts.





SMALL HAND TRUCK SPRAY-PAINTING OUTFITS FOR ONE OPERATOR





A few Labor-Saving Methods from Fort Worth

The East Front Street Shops of the Northern Texas Traction Company Are Laid Out to Give Efficient Routing of Work and Easy Handling of Equipment

By J. T. Porter
Master Mechanic Northern Texas Traction Company, Fort Worth, Tex.

UPON the completion of the new machine shop and repair tracks at the East Front Street shops of the Northern Texas Traction Company, Fort Worth, Tex., several labor-saving and time-saving devices were installed which have been of great assistance in keeping down maintenance costs.

An accompanying illustration gives a complete view of the air-test bench. We have two air mains leading to this bench from the main air reservoirs in the shop. Main No. 1 has 90 lb. pressure, and main No. 2 has reservoir or 120 lb. pressure. By means of necessary valves, gages, cylinders, etc., we are able to test all air equipment, for city and interurban cars, including air governors, triple valves, engineers' valves, double check valves, feed valves, pilot valves, emergency valves, door engines and brake cylinders.

Overhauling and Testing Compressors

Another illustration shows a close-up view of our air compressor work bench. This bench is 9 ft. long, 2½ ft. wide, and 2¼ ft. high. Suspended underneath the bench is a 16-in. x 36-in. air reservoir. Also shown in the illustration is the air gage connected to the air reservoir and the two pet cocks. One has a $\frac{3}{32}$-in. orifice, the other has a $\frac{5}{64}$-in. orifice. After a compressor has been repaired it is hooked up to the reservoir under the bench by means of the standard ¾-in. hose and coupling, and the compressor is tested to see whether it will pump to its required pressure within its allotted time. After the required pressure has been reached in the reservoir, one of the pet cocks is opened (depending on the capacity of the compressor) and the compressor if in good condition will keep the pressure up to 75 lb. in the reservoir while the air escapes through the pet cock. Sixteen-foot compressors are tested with the $\frac{3}{32}$-in. orifice open, and the 25-ft. compressors are tested with the $\frac{5}{64}$-in. orifice open.

The bake oven in use by the armature department for baking armatures is another important adjunct. The heat is controlled by a 210-deg. Fahrenheit thermostatic control system as made by the Consolidated Car Heating Company. The bake oven was made in our blacksmith shop out of No. 10 gage sheet iron. It is 6 ft. long, 4 ft. wide, and 3 ft. high. The heat is supplied by two circuits of 600-volt standard car heaters as made by the Consolidated Car Heating Company. The jib crane shown in the illustration has a radius of 10 ft. and facilitates the putting in and taking out of armatures to the oven from the banding machine or armature racks.

The armature rack shown in another illustration is self-supporting and can be placed in any convenient space about the armature department; it is a cupped-

Testing and Overhauling Equipment

No. 1—Test bench for air brake parts.
No. 2—Air compressor repair and test bench.
No. 3—A conveniently located jib crane serves the baking oven.
No. 4—Removing car wheels with a pit jack.
No. 5—Self-supporting armature rack.
No. 6—Armature rack mounted on wall.

shelf construction and will hold all types of small armatures, thus eliminating the many special racks for the various types of armatures. Armature racks of the same construction are mounted on the wall to take care of defective and other armatures that are seldom used.

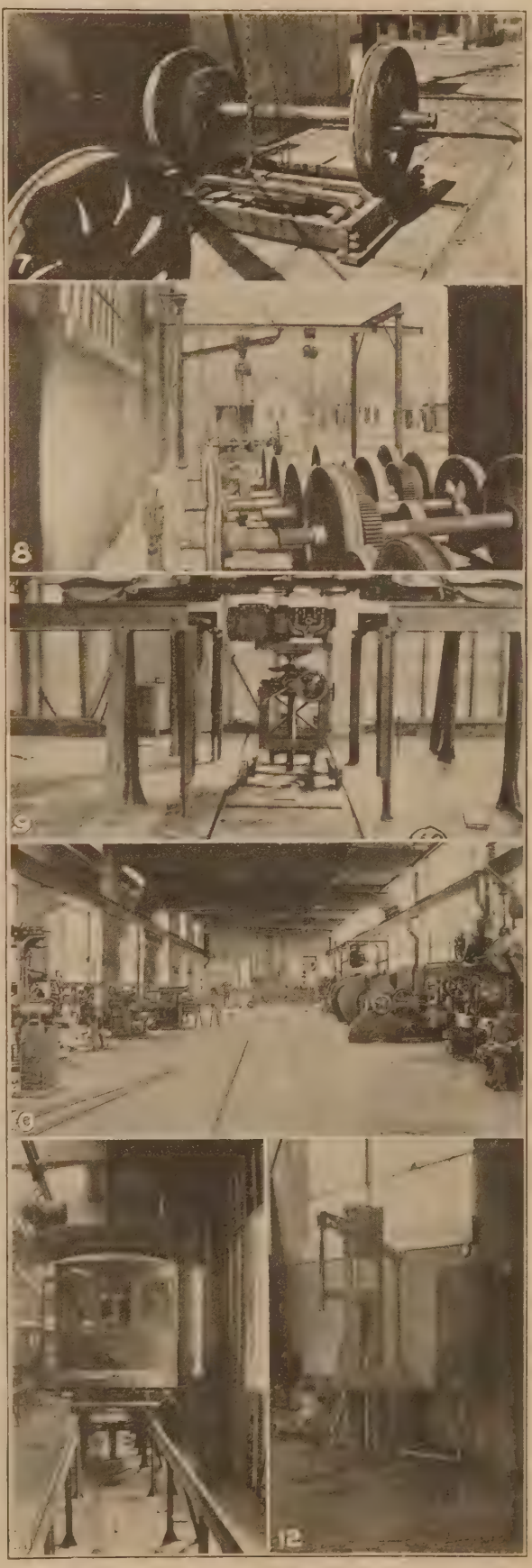
The wheel jack which we have is a great labor saver as well as a time-saving device. By means of the overhead cranes the car body and truck weight is taken from the wheels and the wheels are then dropped out of the truck and rolled on the wheel-changing carriage to the wheel-storage track as shown. At the wheel-storage track a new pair of wheels is placed on the carriage and rolled into place under the car. The carriage is raised and lowered with an 8-in. hydraulic ram. A tank of sufficient capacity is located in a small pit filled with oil which is used to displace the ram. The ram is operated with a brake valve, the air line having a constant pressure of 80 lb. The wheel-storage track is constructed with two standard-gage tracks staggered on the same ties, thus giving nearly double the storage capacity of wheels on the one track space. The cranes for picking up the wheels and the wheel jack carriage, running on its own narrow-gage track, are great labor savers.

Our method of changing air compressors is very efficient. The car is placed so that the air compressor is directly over the wheel-jack carriage. The wheel-jack carriage is then moved out of the way, giving a clear space to work in. A hand jack made by the Electric Service Supplies Company is then used to remove and replace the compressors. This system of changing compressors saves much time and also saves hard labor on the part of the men.

Air Press for Removing Armature Bearings

An air press made in the shop and used principally for pressing armature bearings in and out of box frame motors is another handy piece of equipment. The lever arm has holes spaced at different distances from the fulcrum, thus permitting different pressures to be applied by changing the arm in the working side of the lever to the hole desired. With 110-lb. air pressure on the 12-in. air cylinder pressures up to 30 tons can be applied.

The arrangement of the machines as shown in the general view of the machine shop was made after a careful study relative to the effectiveness of a good layout. On the right-hand side of the picture are shown the wheel press, boring mill, wheel lathe, 42-in. lathe and 26-in. lathe. On the left-hand side are shown the tool grinder, power saw, drill press, pipe threading machine, bolt machine and shaper. At the rear is shown the armature department, containing bake oven, banding lathe and work bench. Traveling the full length of the shop is a 5-ton electric crane. Throughout the length of the shop is a 36-in. track connected to two branch lines at right angles by turntables. These two branch lines lead directly to the two wheel-changing jacks. The wheel-jack carriage runs on this narrow-gage track, thus facilitating the disposal of old wheels by leaving them at the wheel lathe, wheel press, etc.



Handling Wheels and Compressors

No. 7—Wheels are placed on a wheel-changing carriage.
No. 8—Wheel storage track with convenient crane and hoist.
No. 9—Pit jack carriage used for removing compressors.
No. 10—General view of machine shop.
No. 11—Overhead traveling cranes raise the car body.
No. 12—Press for installing and removing armature bearings.

Lift Truck Produces Substantial Savings in Railway Shop

Third Avenue Railway, New York City, Is Finding Many Opportunities for Handling Maintenance Material by a Tier-Lift Truck Operated by One Man

THE problem of economical and speedy handling of all classes of railway shop materials is being effectively solved by the use of a lift truck in the shop of the Third Avenue Railway, New York, N.Y. This truck has been in use only a very short time, but the multitude of uses indicates the immense value and the substantial saving that can be brought about by lessening handling costs, increasing storage space and speeding up the transference and handling of material.

Before the introduction of this truck materials were transported about the shop through the usual type of hand-drawn trucks found in most electric railway shops. The various machine tools were served by either jib cranes or traveling cranes, and where it was necessary to transport the material by means of a supply car, this was loaded by hand with the various small parts which could be conveniently lifted by one or two men, a crane on the car handling the larger parts. Some of the revised methods inaugurated since this truck was received are shown in the accompanying illustrations.

A LOAD OF MAINTENANCE MATERIAL READY FOR LIFTING TO THE SUPPLY CAR

DEPOSITING A SKID LOADED WITH CONTACT PLOWS AND FENDERS ON A CRANE CAR

The particular truck in use is the Lakewood Engineering Company's tier-lift truck, model 703. This truck has a load capacity of 4,000 lb., which may be lifted at a rate of 1 ft. in eighteen seconds to any height between 11 in. from the floor up to 60 in. Where it is particularly desirable to save time, the load can be lifted while the truck is being operated to transport the load. The truck has an over-all height of 79½ in. and an over-all length of 121½ in. with the steering handle in operating position and 109 in. with the step and steering handle folded. The over-all width is 36 in. The platform consists of a steel checkered plate with a length of 54 in. and width of 26 in. The platform height in the lowered position is 11 in. from the floor. The drive is two-wheel, with worm and gear, with a wheelbase of 62 in., wheel tread at the operating end of 27 in. and wheel tread at the load end of 19½ in. This truck has a turning radius at the extreme outside corner of 92 in., at the extreme inside corner of 42 in. and for the outer wheels, 78 in. The wheels are fitted with solid rubber tires, the operating end being 20 in. x 3½ in. and the platform end 10 in. x 4 in. The weight of the truck without batteries is 2,400 lb. The motor for main drive is 24 volts, 65 amp., series wound, entirely inclosed and dustproof. The lifting motor, which is an independent unit, is 24 volts, 40 amp., with ample overload capacity for short periods.

The battery used is the General Lead Battery Company's standard industrial truck type. It has twelve cells of seventeen plates each of the "H" (heavy) type, the positive plates being $\frac{15}{32}$ in. thick. The battery has a capacity of 252 amp.-hr., at the four-and-one-half-hour rate of discharge equivalent to 6 kw.-hr. Special compound non-breakable jars, $\frac{5}{32}$ in. thick, are used. The trays are hard maple, slow-heat paraffined and then treated with acid-resisting asphaltum paint. Bolted connectors are used for cells and the Westinghouse patented joints for tray connections. The battery complete weighs 685 lb.

To operate the truck, the operator stands on a low step. The controller is conveniently located at his left hand when he faces the platform and the steering lever is on his right. Three speeds forward and three reverse speeds are provided. A small controller located immediately in front of the operator with one speed in either direction controls the up and down operation of the load platform. This control includes dynamic brake contacts to stop the load platform instantaneously in any desired position. This controller is automatically returned to neutral position when the load platform reaches its maximum tiering height or its extreme down position.

The brake action and a safety switch are controlled by a foot pedal on the platform. This arrangement is such that the brakes are fully released and the switch closed when the pedal is pushed down flush with the

floor. When the operator steps from the truck or removes his foot from the pedal the safety switch in the controller automatically breaks the current. At the same time the brakes are automatically set. It is thus practically impossible to operate the truck except in the normal operating position.

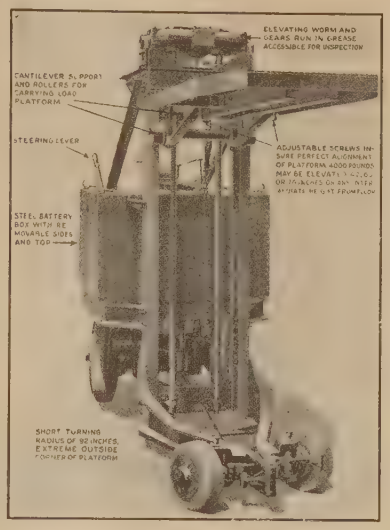
Load Platform Has Cantilever Support

The stresses set up by the load on the platform are carried by a cantilever type support and are distributed through heavy steel rollers, each mounted on two high grade annular ball bearings. The load on the platform is balanced over the load carrying wheels, which eliminates the tendency for the truck to tip when the load is raised.

There are two adjusting screws under the platform to insure perfect alignment of the platform should the rollers wear slightly after long usage. The load platform is lifted by two forged steel phosphor bronze bushed trunnion nuts. These trunnion nuts operate on two vertical steel screws.

The housing in which the two worm gears at the top of the column are mounted is supported on a trunnion. Hence it may oscillate to obviate any possibility of binding on the vertical screws due to the twisting of the frame or slight wear in the cantilever support rollers. This housing is packed in grease. The frame for supporting the column and the axles is made of cast steel. The load platform of corrugated steel is hinged at the column end so that if it should strike an obstruction when the load is being lowered it would simply raise the platform and not strain the supporting mechanism. The battery box is made of sheet steel with sides and top removable, so that the batteries are accessible for inspection and maintenance repairs.

The combination of an elevating platform with a load-carrying truck assists materially in lessening handling costs, as much of the material handled in any electric railway maintenance shop must ultimately be raised to machines or benches or lowered to the shop floors. With such a type of truck it is possible to run the platform underneath the compressor of a car, raise the platform so as to support the compressor while it is being loosened from its supports, then lower sufficiently to clear the car body and back out of the way. The compressor can then be transported to the overhauling shop and be placed on the compressor overhauling bench


ELEVATING WORM AND GEARS RUN IN GREASE ACCESSIBLE FOR INSPECTION
CANTILEVER SUPPORT AND ROLLERS FOR CARRYING LOAD PLATFORM
STEERING LEVER
STEEL BATTERY BOX WITH REMOVABLE SIDES AND TOP
SHORT TURNING RADIUS OF 92 INCHES, EXTREME OUTSIDE CORNER OF PLATFORM

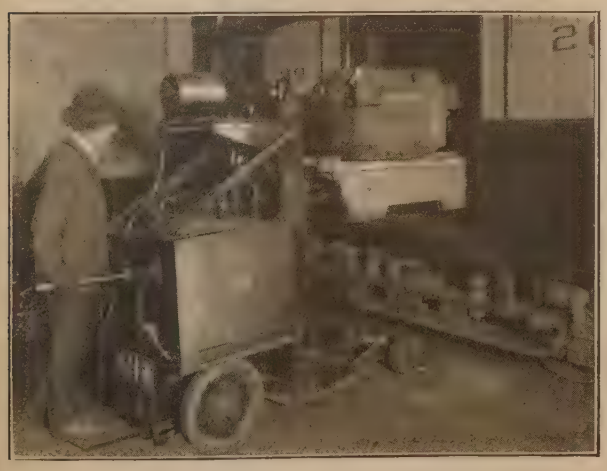
Lift Truck with Platform Raised

by one man. The reverse operation can also be carried out by one man when the compressor is ready for reinstallation. Ordinarily such an operation would require from two to six men, and the time consumed would be materially greater. Also many of the disagreeable features of the work are removed, as the truck does the lifting and transporting and the operator finds real enjoyment in propelling the various parts through the shop and in placing them in repair locations.

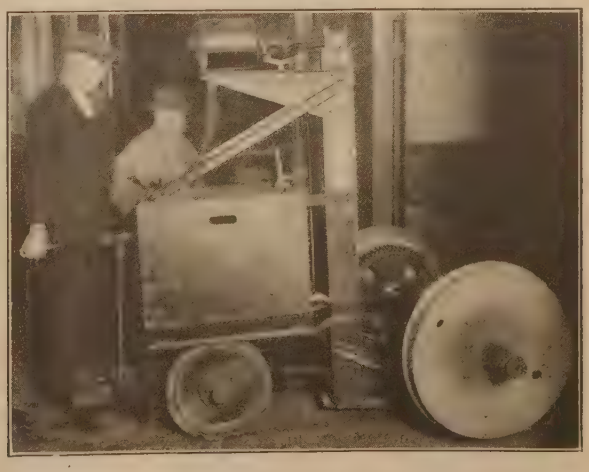
Wheels Can Be Picked Up and Placed in Wheel Lathes for Turning by One Man

The serving of the various electric railway shop tools by a lift truck is another economy being practiced by the Third Avenue Railway. An accompanying illustration shows the truck just as it has picked up a pair of wheels as they were removed from a car. The platform is low enough so that it can be run underneath the axles of the smallest pony wheels and the lift of the platform is sufficient to take care of the largest drivers. Without further work the operator can transport the wheels to the machine shop and place them in the wheel turning lathe for turning or in the wheel press for removal of the wheels. Most electric railway shops, however, are equipped with cranes for handling wheels into and out of these machines. In such cases the truck can deposit the wheels in a convenient location or, where space accommodations are limited, the storage capacity can be increased considerably by piling the wheels as desired.

Other work readily taken care of by this truck in-



Heavy Motors Are Readily Loaded Into Supply Cars by One Man



Wheels Can Be Picked Up from Cars and Readily Transported to Shop for Overhauling

cludes the picking up, transporting and placing of motor shells in lathes for reboring, the placing of shafts, armatures and other heavy parts in lathes and the handling of heavy castings which require drilling. Two of the accompanying illustrations show the lift truck in the operation of placing skids of maintenance material in position on supply cars. The Third Avenue Railway uses several types of supply cars for transporting various maintenance materials to the shops and points where they are used. One of the illustrations shows a skid loaded with contact plows and fenders being loaded on a large crane car, while another shows the truck in the act of depositing a large motor through the door of another supply car. The economies resulting from this rapid and easy handling of material by one man will be readily appreciated by those engaged in such work. For convenience in handling various classes of small material, it is desirable to use platform body skids, platform boxes, dump skids and roller platform skids. To meet these conditions the Lakewood Engineering Company has developed a very complete line. Material can be kept in the storeroom racks on platforms and can be taken out as each set of parts is required. Where space is at a premium, the various types of skids can be piled one on top of the other and can be so arranged that these can be removed without disturbing the loads in other parts of the pile. In storerooms which are provided with such a truck, properly designed racks will effect material economies in storage and also give facilities for depositing and removing loads.

Two Aspects of the Tie-Treatment Question

"Shall Tie Treatment Be Charged to Maintenance?" Is First Considered, After Which the Author Gives Statistics as to the Subject in General and Shows When Tie Treatment Pays

BY HOWARD H. GEORGE
Engineer of Maintenance of Way, Public Service Railway, Newark, N. J.

IN THE ISSUE of the *Railway Age* for Feb. 18, 1922, page 416, there appears an article by Earl Stimson, chief engineer of maintenance, Baltimore & Ohio Railroad, entitled "Should the Cost of Treating Ties Be Charged to Maintenance?" The basis of the reasoning in Mr. Stimson's article was this question: Should the treatment of a wooden tie with preservatives be considered in the same category as the case of a wooden tie being replaced by a steel or other substitute tie, thus entitling the cost of the treatment to be capitalized? His conclusion, from the viewpoint of the maintenance engineer rather than that of the accountant, was that the practice on his property of charging the cost of treating ties to maintenance is justified.

A section of the I. C. C. classification of accounts for steam roads was quoted to show that the intent of the classification, as far as ties is concerned, is to permit of capitalizing only the excess cost of metal ties over wood ties, and does not make any mention of excess cost of treated over untreated wood ties. Mr. Stimson's contention, however, that it is plainly evident that the commission did not intend to consider treatment as a "betterment" is not borne out by the facts. Athough it is true, as he stated, that in the above classification no specific mention is made of treated ties, it is equally true that in the commission's definition of the term "betterment" no specific mention is made of many other items which are properly considered as betterment. The corresponding account (No. 6, Road and Equipment) in the standard classification of accounts of the American Electric Railway Accountants' Association reads as follows:

> 6—Ties—To this account should be charged the cost of cross, switch, bridge and other ties and railway crossing timbers laid in main and repair tracks, sidings, and spurs; in tunnels, station, shop and other yards; on wharves, piers, track scales, inclines, bridges, trestles, culverts, in carhouses, shops and storehouses, and on transfer tables and turntables. To this account should be charged also the cost of transportation, inspection, handling (except final distribution) *and any process of preservation.*

Mr. Stimson took the position that if the earnings are large, it is desirable to put a portion back into the property. It is gratifying to know of a railroad property whose earnings today are large enough to be able to pay for betterments of this character, but such a state of affairs exists on but few electric railway properties. On the other hand, many of the latter who, a few years ago, were using treated ties almost exclusively have been obliged as a temporary expedient either partly or entirely to discontinue the use of treated ties because of the demand for immediate economy in order to tide over the present emergency.

TIE RENEWAL ON STEAM AND ELECTRIC ROADS COMPARED

There is no question that, from the viewpoint of the average steam road maintenance engineer, whose main problem is either extensive tie or rail renewal (but seldom both at the same time in the same track), the logical place to charge the treating cost is to maintenance. Certainly it is true that casual renewals of a few ties here and there on electric railway properties are and properly should be charged to this account. It is not practicable to split charges for such renewals between operation and construction. In the case of major renewals, however, where the entire structure is being rebuilt or entirely replaced, and the estimated or actual cost of the old track is written off, it would seem to be decidedly unfair to charge to operating expenses the increase in cost of a treated tie due to the treatment itself.

Suppose that we consider from the electric railway standpoint the case of a track being entirely replaced. The original track was constructed with untreated wooden ties which cost and were capitalized at, let us say, 80 cents each when the track was built, while the new track is being constructed with creosoted ties costing, say, $1.75 each. It is customary in such cases to write off the entire estimated original cost of such track and charge the entire cost of such new track to the capital account. If this is done, the addition to fixed capital will certainly include the difference between the

cost of the old ties and the cost of the new ties, and a part of this difference is the cost of treatment.

In the same way, if an untreated red oak or short-leaf pine tie had been replaced by a good white oak tie, which always costs more than the first-mentioned ties, the excess cost would also have been included in the amount chargeable to new capital. Similarly, if a piece of new track with treated ties were being built as an extension, whether by a steam road or by an electric road, the cost of treatment would certainly be capitalized along with the other costs. Added value undoubtedly accrues to the track, increased life of the substructure surely results. There is also a proportionate decrease in the annual maintenance charges for tie renewals, and, what is even more important in the case of street railways, in the cost of replacing the concrete base where ties have to be replaced. The substitution of a tie which will last at least twenty years in a track for an untreated tie having a life of only ten or twelve years should certainly be considered a betterment. An excellent example to prove the value of creosoting ties is the case of track laid in Denver in July, 1898, and reconstructed during the summer of 1920, a description of which appeared in the issue of the ELECTRIC RAILWAY JOURNAL for Jan. 22, 1921, page 187. After twenty-two years of continuous service, these ties, which were of hemlock, were found to be in an excellent state of preservation.

MECHANICAL WEAR RATHER THAN DECAY INTERESTS THE STEAM RAILROAD ENGINEER

It is to be expected that the viewpoint, on this subject, of the steam railroad engineer, whose general experience is that the most frequent cause for tie renewal is not decay but rather mechanical wear, will differ materially from that of the street railway engineer, with his radically different conditions. Of course, treatment does not increase resistance to wear. Mr. Stimson stated that "in the case of a metal tie substituted for a wooden tie, there is unquestionably a substitution of a superior part for an inferior part, as the tie is made of a radically different and structurally superior material." Now the life of a tie in a street railway track is seldom determined by its mechanical strength, but rather by its ability to resist decay, and a properly treated wooden tie has fully demonstrated its ability to do this. It is a common occurrence to renew rail on creosoted ties without disturbing the ties, ballast or concrete paving foundation in the slightest degree. Hence if it is reasonable that the excess cost of steel over wood ties should be capitalized, the same is true of the cost of tie treatment.

In one paragraph of the article in question appears the following statement:

> The rapid rise in the price of timber has increased the price of the tie in much greater proportion than the cost of treatment has increased. Less expensive treatments that have been found adequate are being used more and more in place of the more expensive treatments formerly considered necessary. The result has been that the ratio of the cost of treatment to the price of the tie has decreased greatly, making the use of treatment not only show greater economies but also reducing the proportion that the excess cost of treatment bears to the total cost of the treated tie. This should in itself stimulate the use of treated ties and not make necessary resorting to the doubtful expedient of capitalizing.

The statement of facts in this paragraph cannot be controverted, although exception will probably be taken by many to the conclusions drawn as to the matter of doubtful expediency of capitalizing treatment of ties for all conditions which have to be considered. It is believed, however, that the thought contained in the above statement as to the economies to be effected by treating ties and timber should be emphasized and advantage taken of this opportunity again to bring to the attention of our industry the urgent need for a greatly increased use of wood preservation. The steam railroads for years have been treating large quantities of timber, especially ties, realizing the importance of conserving as much as possible the available supply, but electric railways have, as a general rule, not appreciated the value or need of treatment to the same degree, and have not adopted it to anywhere near the same extent as the steam roads.

WHAT IS OUR TIMBER SITUATION?

Leaving now the subject of charging tie treatment to one account or another, let us examine the timber situation as a whole so as to appreciate the necessity for more extended use of preservative treatment.

E. H. Clapp, then assistant forester, Forest Service, United State Department of Agriculture, in testifying before the Committee on Interstate and Foreign Commerce of the House of Representatives on July 19, 1919, regarding the shortage of railroad ties (see report on House Resolution No. 20, 66th Congress), stated that the maximum requirement of ties reached about 150,000,000 in 1907, falling to a little under 100,000,000 in 1915, and that the average for the preceding fifteen years had probably been in the neighborhood of 125,000,000 ties, representing a total of about 4,000,000,000 ft., board measure, these figures including both steam and electric lines. Lumber production for all purposes in the United States reached the total of 46,000,000,000 ft. b.m. in 1906 and 1907, dropping to 40,000,000,000 ft. b.m. in 1914 and to 32,000,000,000 ft. b.m. in 1918. Including other wood products, such as fuel wood, the total annual cut of timber in the United States probably reaches between 90,000,000,000 and 100,000,000,000 ft. b.m. It was estimated that in addition to the above, probably about 10,000,000,000 ft. b.m. should be added to cover losses by fire. The original forest area of the United States was estimated at about 850,000,000 acres, of which about 230,000,000 acres of mature timber was standing at that time, or not much more than 25 per cent. The total forest acreage at that time, including cut-over lands, was estimated at about 500,000,000 acres, of which about 100,000,000 was very largely waste and another 180,000,000 acres had some timber on it of comparatively inferior quality. Mr. Clapp stated that the annual growth was only about 35,000,000,000 ft. b.m. as against an annual consumption of between 100,000,000,000 and 110,000,000,000 ft. b.m. *Commerce Reports* for Feb. 6, 1922, states that a total of 3,149,788 railway ties were exported during 1921, of which almost half went to Canada.

Against the above total consumption of timber there was treated in 1909 (see report United States Department of Agriculture, Forest Service) only a little over 911,300,000 ft. b.m. of timber of all kinds, which included only about 20,700,000 ties, or about 745,000,000 ft. b.m. In 1913 the amount of timber treated for all purposes had increased to a total of a little less than 2,000,000,000 ft. b.m., which included about 43,850,000 ties, or about 1,580,000,000 ft. b.m., and in 1918 the amount of timber treated for all purposes had dropped to about 1,470,000,000 ft. b.m., which included about 30,600,000 ties, or about 1,102,000,000 ft. b.m. The total axerage amount of timber treated for the ten years preceding 1918 was only about 1,584,000,000 ft. b.m., which

included only about 33,000,000 ties, or about 1,190,000,000 ft. b.m. Compare this with the total average consumption of, say, 125,000,000 ties per year and the result is only about 25 per cent. Or, if we compare the total lumber consumption per year of 110,000,000,000 ft. b.m. with the total amount of timber treated for all purposes of about 1,584,000,000 ft. b.m., the result is only about 1.40 per cent.

Electric Railways Are Behind in Tie Treating

The total mileage of electric railways in the United States is, roughly, 44,000. The writer has just had occasion to analyze the replies to a questionnaire on railroad ties sent out by the American Electric Railway Engineering Association, in order to secure data on present practice among member companies for the use of its representative on the sectional committee on standardization of railroad ties which has been formed under the direction of the American Engineering Standards Committee. The member companies number about 350 and represent a total of about 33,500 miles of trackage. At the time of the writing of this article 179 replies had been received from companies having a total of 26,006 miles. This covers more than 51 per cent of the total number of member companies and nearly 78 per cent of their total mileage, or about 60 per cent of the total electric railway mileage in the United States. Out of the 179 companies which replied only sixteen, representing 2,140 miles of track, reported using all treated ties. Forty-two companies, with 7,628 miles of track, reported using part treated ties, while 121 companies, with 15,238 miles of track, reported using no treated ties. The companies reporting were from practically every state in the Union and included every large property. The result of this canvass may therefore be taken to represent, with a reasonable degree of accuracy, the situation throughout the country. According to the above analysis only 8.9 per cent of the electric railway companies, representing 8.2 per cent of the total mileage, are using all treated ties, another 23.4 per cent of the companies, representing 29.3 per cent of the total mileage, are only partly using treated ties, while the remaining 67.7 per cent of the companies, representing 62.5 per cent of the total mileage, are using no treated ties whatever. These figures represent 1922 practice among our street railways.

Not every company is as fortunate as the Boston Elevated Railway, which, in 1916, installed its own pressure wood-preserving plant (see ELECTRIC RAILWAY JOURNAL, Nov. 18, 1916, page 1065), but many are located within reasonable distance of some commercial timber treating plant, and there is always left for consideration the open tank and dipping processes, which are better than none at all. And for other timber there are still available the brush or spray treatments, which have their merits. When all the facts are considered, it is quite probable that either the open tank, dipping, or brush treatments will be most practical from an economical standpoint. The question resolves itself into one of "How much can we afford to spend for treatment?"

Economic Features of Tie Treatment

E. F. Paddock has compiled a very complete set of tables showing the annual charge in per cent of the total original cost for various periods from one to twenty-five years, with interest at 5 per cent. From this table we find that the annual charge expressed in per cent of the original cost of an article whose total life is, say, five years figures out to be 23.0975 per cent. If its life is seven years this annual charge figures out 17.282 per cent of the original cost; if ten years, the annual charge is only 12.9505 per cent, and so on. To apply this to the case of a tie, assume an untreated tie which has decayed in five years to the point necessitating renewal, the tie having originally cost 65 cents delivered or, say, 85 cents each in the track. The annual charge at 5 per cent on 85 cents for five years is therefore 23.0975 per cent of 85 cents or 19.6 cents. Suppose it can be demonstrated that open-tank treatment would increase the life of such ties to ten years and that it cost 25 cents to treat the tie by such a method. The total cost of the treated tie would then be 85 cents plus 25 cents or $1.10, and the annual charge would be 12.9505 per cent of $1.10 or 14¼ cents, as compared with 19.6 cents for the untreated tie, a saving of 5¼ cents per year per tie. If ties are laid on 2-ft. centers, this means 2,640 ties per mile, a saving of $140.80 per mile per year. On a property of, say, 100 miles this means $14,080 per year or the equivalent of a 4 per cent dividend on $352,000.

Or, to cover the case of a treatment which would add only two years life to such a tie, we can then afford to increase the initial cost of such a tie to 1.336 times the cost of the untreated timber. We can afford to spend 33.6 cents on every dollar's worth of such timber that will increase its life from five years to seven years, without increasing the annual charge. With lumber at $60 per thousand feet board measure this would amount to $20.16 per thousand feet for treatment. If the treatment increases the life from five to ten years, this figure is 78.35 cents on every dollar, or $47.01 per thousand feet board measure.

As was shown, we are producing only about one-third as much lumber as we are consuming each year, and the figures given should serve to emphasize the urgent need of conserving our timber supply as much as possible and to show the economies to be effected by the use of wood preservation and the effect a greater use of such preservation would have on such a program of conservation.

Electric Railways Earned 4.11 per Cent in 1919

OF THE 1,603 electric light and power companies making income tax returns for 1919, 454 had no net income whatever. Among 1,046 electric light and power companies it was found that the net income was 6.53 per cent of the invested capital. The figures have just been compiled by the Bureau of Internal Revenue. The total net income of 1,149 electric light and power companies was given as having been $49,515,624 in 1919. On this income tax to the extent of $4,639,440 was paid, in addition war profits and excess profits taxes were paid to the amount of $1,164,563. The deficit reported by the 454 companies which reported no net income was $4,360,909.

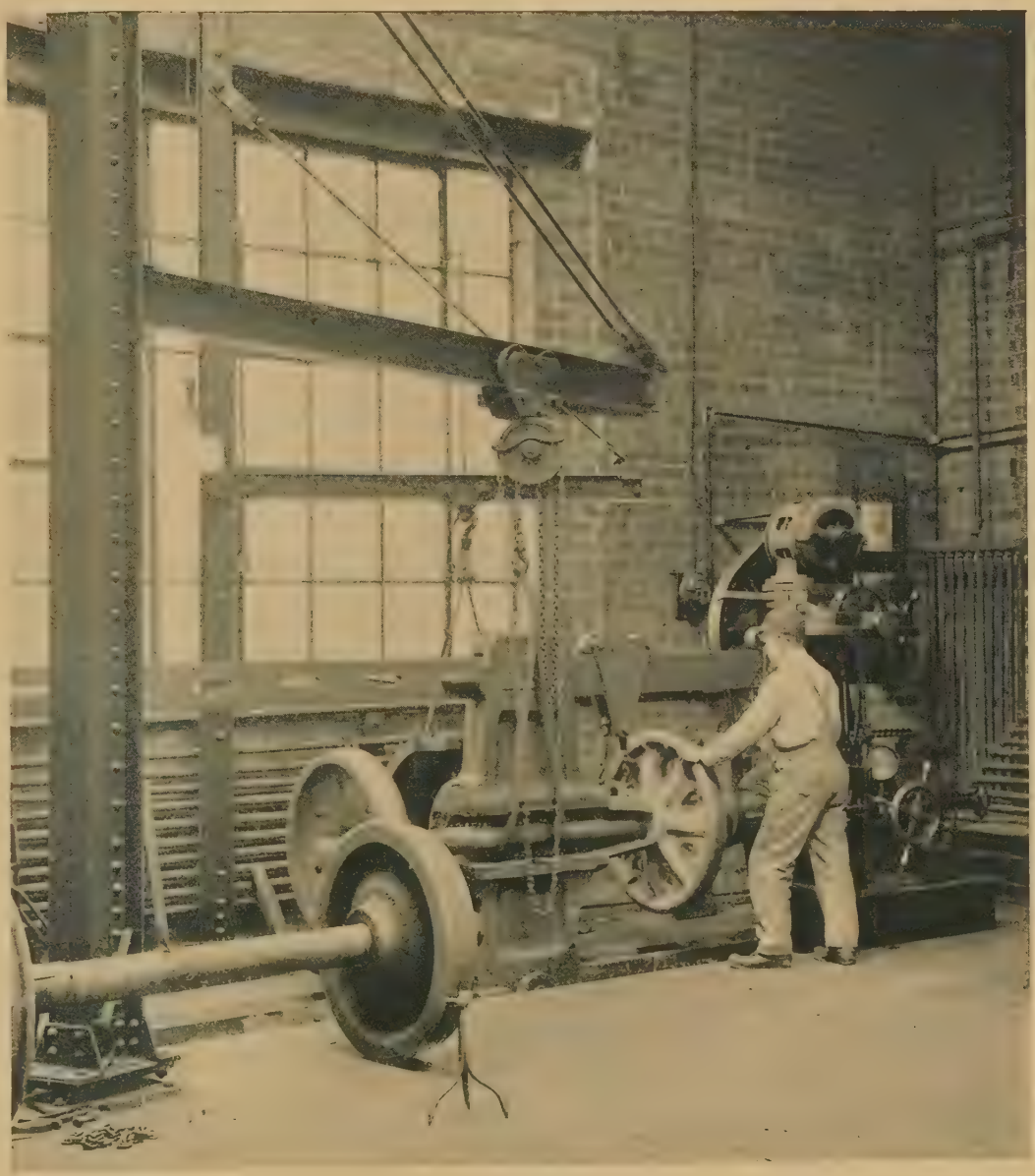
According to the bureau's figures, all transportation and other public utilities show their net income to have been 6.39 of the invested capital. For the steam railroads the figure was 4.78 per cent; for electric railroads, 4.11 per cent; for ocean lines, 23.46 per cent; for gas companies, 6.07 per cent; for telephone and telegraph companies, 7.01 per cent.

There were 242 electric railways which reported a net income of $29,387,511. Their total tax was $3,126,002. There were 196 electric railways which had no net income. Their deficit is shown as being $10,860,272.

Special Pictorial Section

"Do It Mechanically"

Labor-saving machinery is gradually supplanting hand and muscle methods, but a more extended use of it can well be made by all electric railway maintenance departments. Examples from various cities are shown in the following pages.



One Man, with Proper Equipment, Can Do a Surprising Amount of Work, and at a Minimum of Cost

An example of up-to-date practice is shown in the above illustration—a wheel press in the shops of the Tri-City Railway & Light Company, Davenport, Ia., admirably served by cranes and hoists. With this outfit, a single operator performs all of the various operations with ease.

Handling Material in the Storage Yard of the Chicago Surface Lines at Thirty-ninth and Halsted Streets, Chicago

No. 1. Handling trackwork with a 5-ton crane car.

No. 2. Handling excavated material by auto truck.

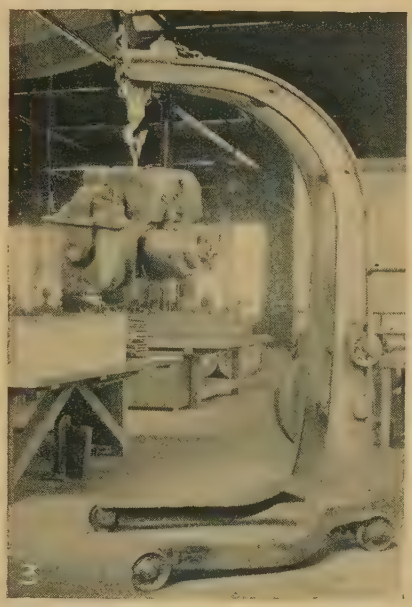
No. 3. Electrically operated yard derrick for unloading and piling rails.

No. 4. Storage space is saved by careful piling.

No. 5. A yard crane equipped with grab bucket unloading old paving blocks.

No. 6. A 5-ton crane car used for placing special trackwork.

No. 7. Yard locomotive for shunting railroad cars loaded with sand, ballast, ties and other material



Materials Handling Devices in the Shops of the Chicago Surface Lines

No. 1. Tray for carrying bearings and other material from the stockroom. The handle is removable, while the end is supported by a pedestal.

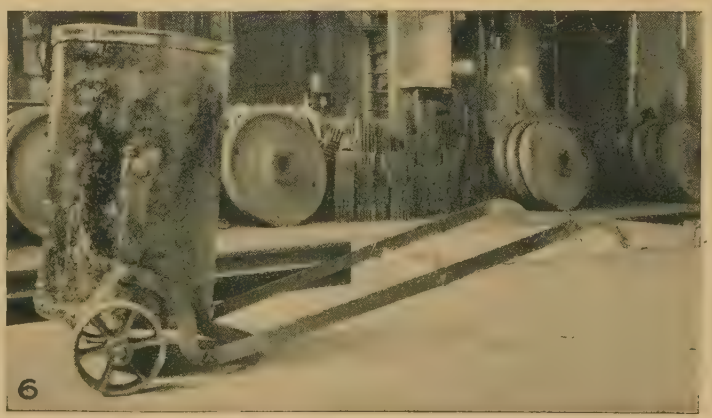
No. 2. Reels of trolley wire and feeder cable are unloaded with an electric hoist controlled by hand from the floor. The overhead track makes a complete loop in the stock room.

No. 3. Compressors to be overhauled are put on the work bench with a movable hand crane.

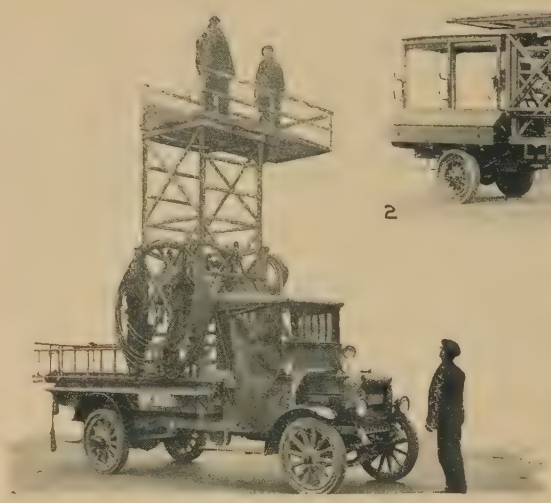
No. 4. The storage drums in the paint supply room are filled directly from the barrel which is hoisted with a 1-ton Yale spur-geared block running on an overhead track.

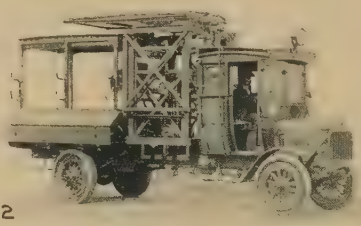
No. 5. A revolvator for stacking rolls of paper in the storage room. This paper is used for printing transfers.

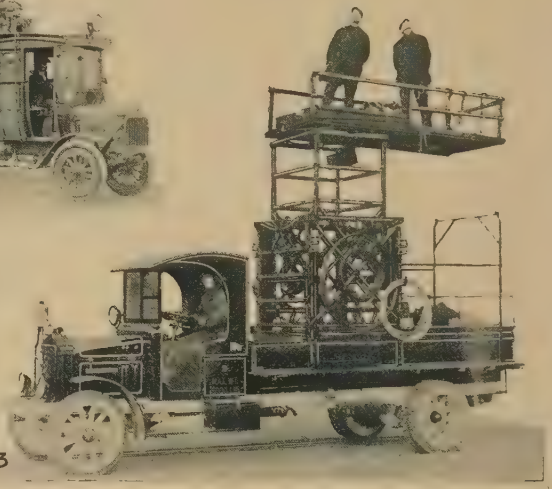
No. 6. Truck and removable swivel mounted can for handling heavy bulk material.



Ever-Ready Tower Trucks Reduce Maintenance Expense and Prevent Delays







No. 1. A Federal tower truck in service on the Detroit United Railways.

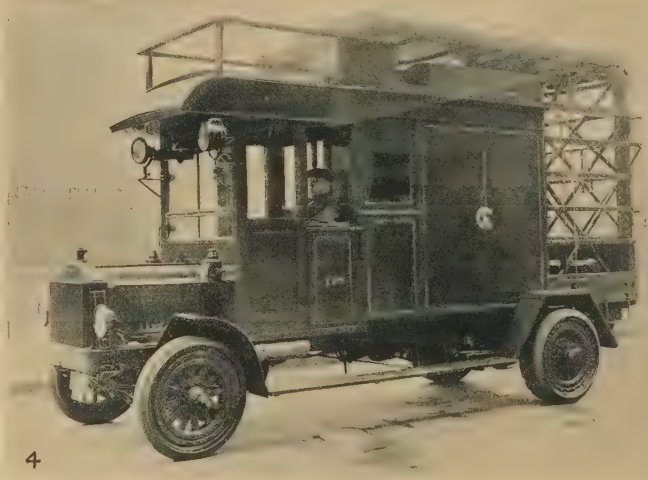
No. 2. Emergency wagon on Standard Motor Truck Company's truck chassis in use by the city of Detroit, department of street railways.

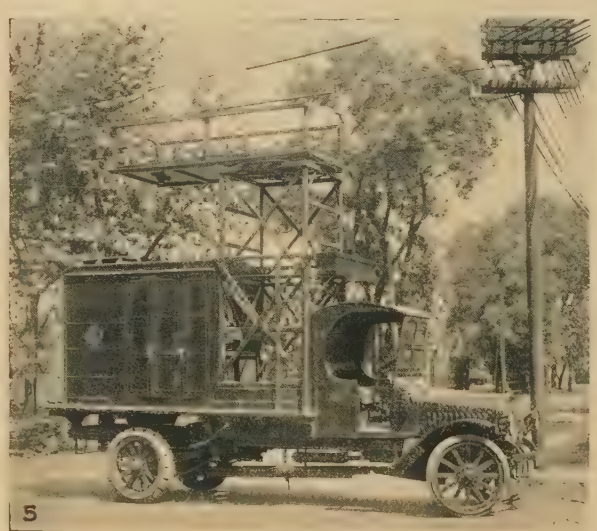
No. 3. Philadelphia Rapid Transit Company's tower truck is built on a two-ton Pierce-Arrow chassis.

No. 4. Specially constructed overhead repair tower wagon mounted on a two-and-a-half-ton Packard truck in service on the Chicago Surface Lines.

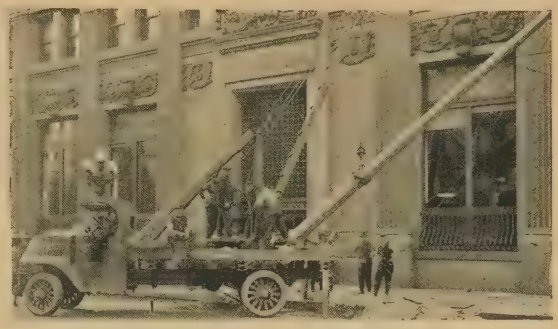
No. 5. Overhead tower mounted on a Mack truck in service on the Chicago & Joliet Railway.

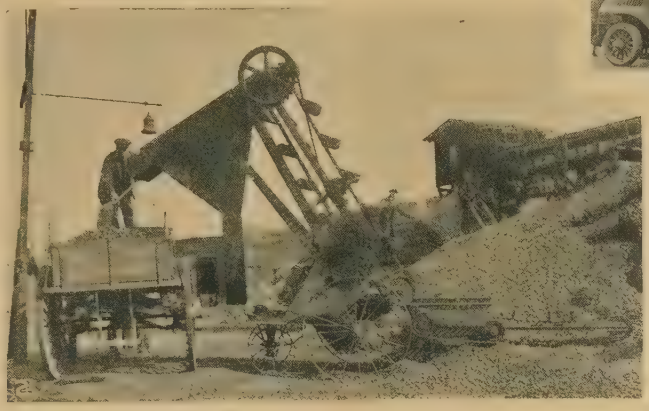
No. 6. Three-and-one-half-ton White tower truck of the Public Service Railway, Newark, N. J.





Cranes and Conveyors Have Many Uses in Material Handling





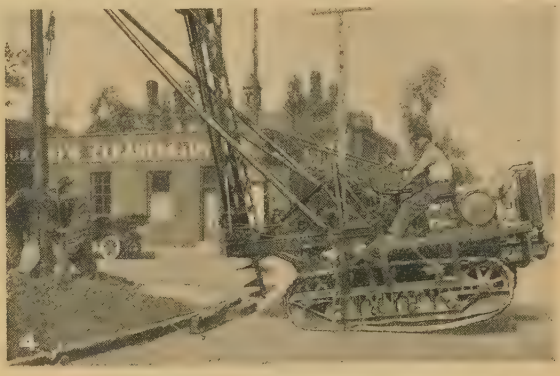
No. 1. Using a Mack truck for emergency handling of poles in Milwaukee. Temporary construction was removed when the job was complete.

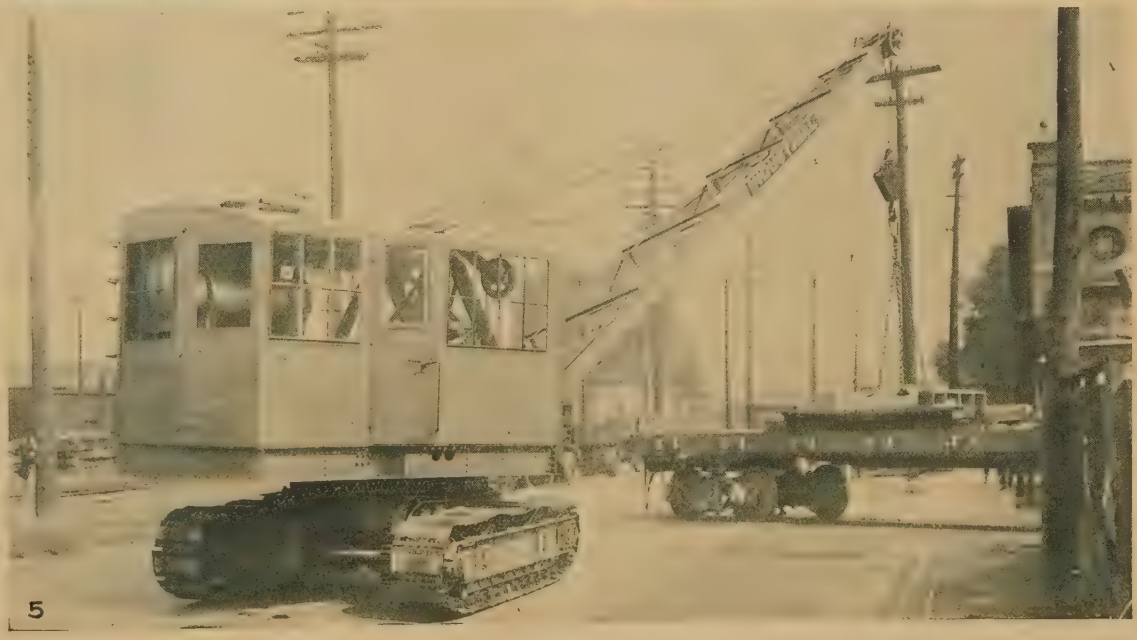
No. 2. Loading coal directly from the pile by means of belt conveyors.

No. 3. Pole-digging and pole-setting equipment mounted on truck in use in California.

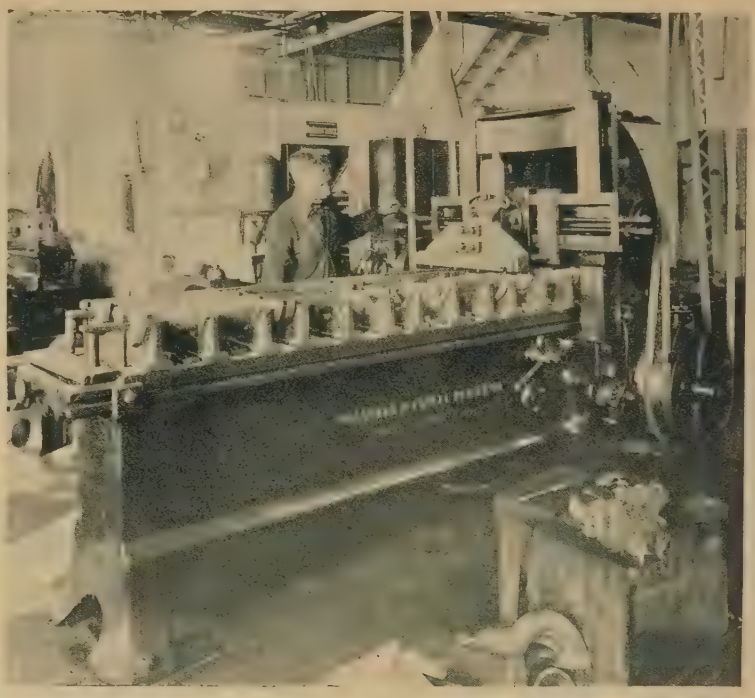
No. 4. Digging holes and setting poles with a caterpillar tractor equipment in Detroit.

No. 5. Crawling tractor with Industrial crane for handling heavy track materials.





Labor-Saving Methods and Equipment Serve All Departments



No. 1. Eighteen axle bearings finished at one time on this planer.

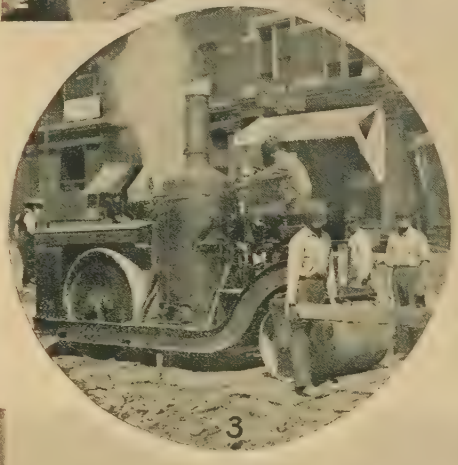
No. 2. Air tools and screw spikes save time in track reconstruction.

No. 3. The steam roller plays an important part in roadbed construction.

No. 4. Track repairs must be made frequently in close quarters.

No. 5. A chain hoist at the end of overhauling pits is a great convenience.

No. 6. Wheel and axle storage requires a traveling crane.



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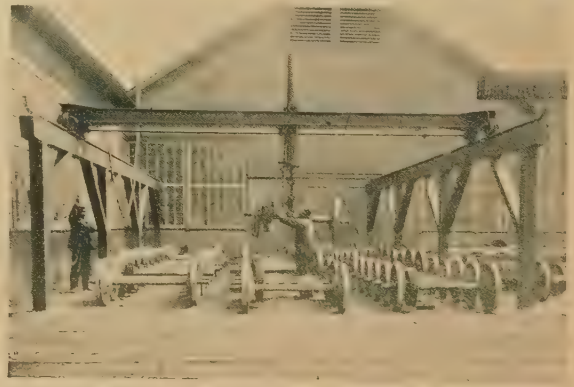
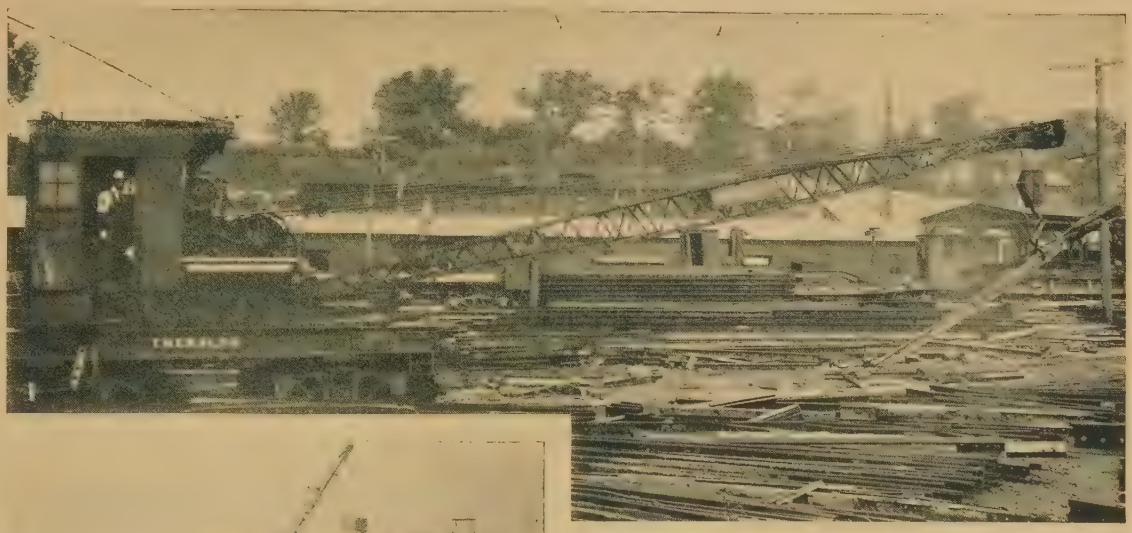




Track Materials Handling and Roadbed Construction in Pictures

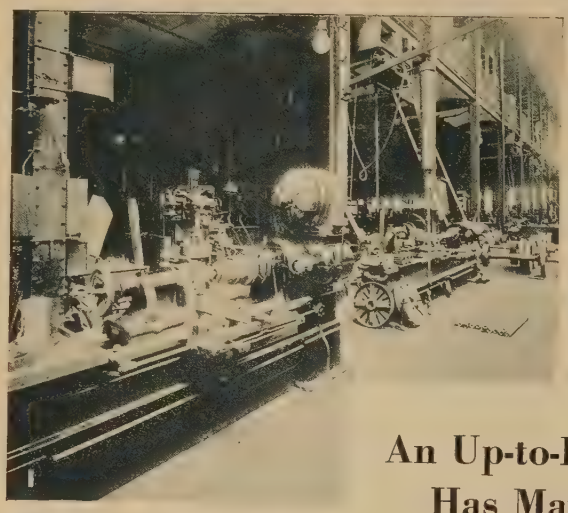
No. 1. Locomotive crane used by the Milwaukee Company for handling heavy parts in the storage yard and for duties anywhere on the property.

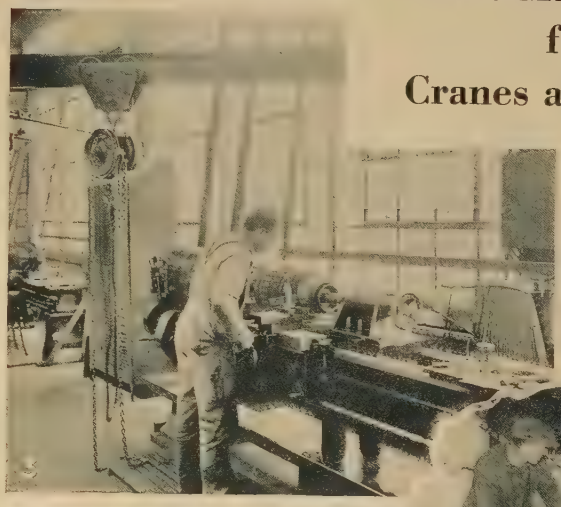
No. 2. Handling ties in the storage yards at Saint Helena, Ore.

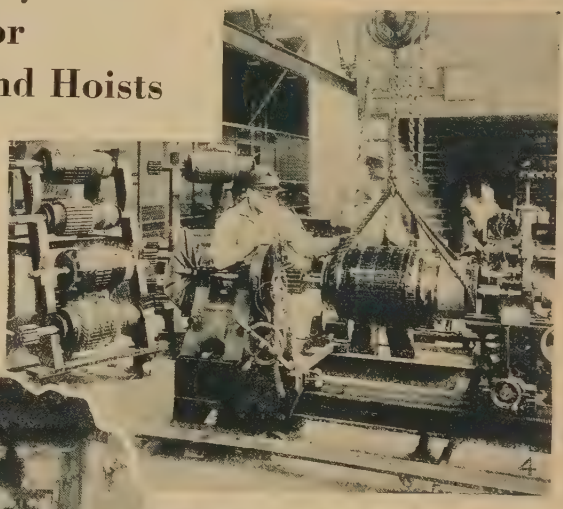
No. 3. A concrete mixer in service during track construction.

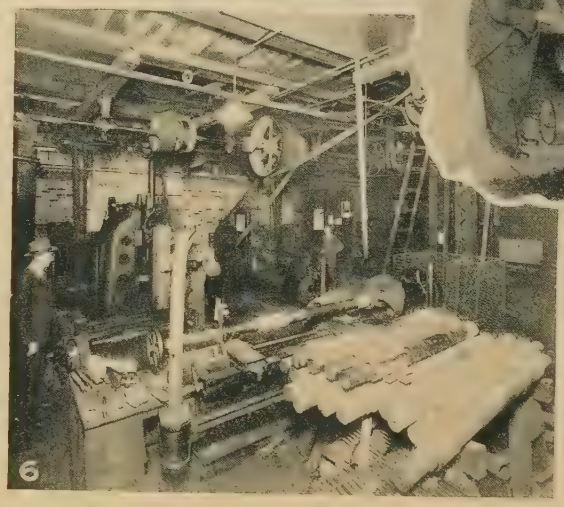
No. 4. An International crane on a Mack truck in service in Cleveland.

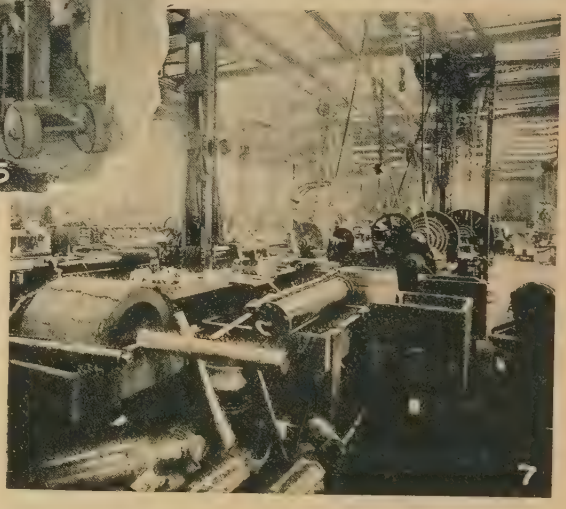
An Up-to-Date Shop Has Many Uses for Cranes and Hoists











No. 1. An air hoist swung from a shop pillar serves two large lathes in the Vincennes Road shops of the Chicago Surface Lines.

No. 2. A portable crane and hoist in the Vincennes Road shops of the Chicago Surface Lines.

No. 3. Overhead traveling chain hoists handle armatures to lathes in the Davenport shops of the Tri-City Railway & Light Company, Davenport, Iowa.

No. 4. An overhead traveling chain hoist handles armatures between racks and lathe in the shops of the Tri-City Railway & Light Company, Davenport, Iowa.

No. 5. A portable air hoist as a handy tool for pits.

No. 6. A hoist is swung from the back of this lathe in the South Side shops of the Chicago Elevated Lines.

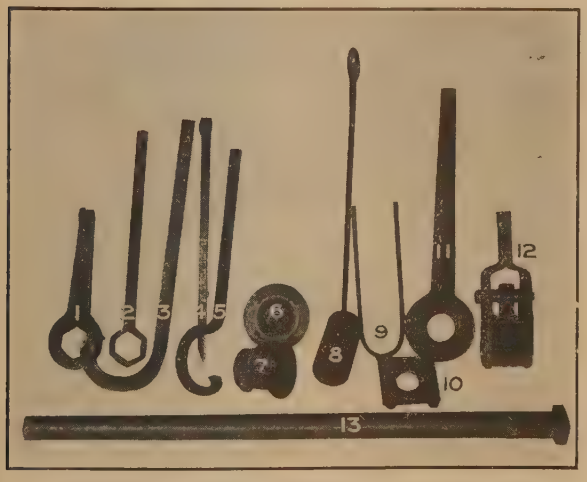
No. 7. A variety of hoists and cranes are used in the shops of the Philadelphia Rapid Transit Company.

Methods and Equipment for Doing Maintenance Work the Labor-Saving Way

Armature Dismantling Tools Reduce Labor Costs

Efficient Tools of Special Construction Enable Workmen to Remove Parts Necessary in Overhauling Armatures Without Danger of Damaging Detail Parts

ELECTRIC railway shops soon accumulate a large number of special tools for convenience in dismantling and assembling various pieces of equipment. The accompanying illustration shows some tools used by the Eighth Avenue Railroad, New York, for dismantling and assembling various armature parts. Tools Nos. 1, 2 and 3 are used for removing the pinion nut. The spanner, 3, has a projection at the end which fits into the tooth of the pinion so as to keep the armature shaft from rotating. Either of the wrenches 1 or 2 is used for unscrewing the nut; 4 is a coil lifter used in connection with the rewinding of armatures; 5 and 7 are used for removing the core nut. The dowels on the flanged end of 7 fit into the holes of the nut, and the projections on the sleeve portion are provided so that the spanner, 5, will fit over these conveniently and give sufficient leverage for unscrewing the nut; 6 is a jig used for redrilling the holes in the core nut. The tool 8 is used for swedging bushings on armature shafts, so as to provide for returning where they are worn below size. The tools Nos. 9, 10, 11, 12 and 13 are used for removing the commutator ring nut. The



SOME TOOLS USED FOR DISSEMBLING ARMATURE PARTS

wrench, 11, has projections which fit into the holes in the ring nut. No. 10 is a wooden clamp used to hold the wrench, 11, in position, and 9 is a U-shaped strap which fits over the end of the armature shaft and holds the armature down. The ratcheting device, 12, together with its handle, 13, is used for turning the armature, while the wrench, 11, holds the nut stationary. This ratcheting device is constructed of an old pinion, the bore of which has been enlarged slightly so that it will slip over the shaft readily. The keyway in the pinion fits over the key of the armature shaft. The dog shown in the center of the ratcheting tool operates in the teeth of the pinion, so that by placing the long pipe handle, 13, on the end projection of 12, this can be ratcheted back and forth and the armature will be turned. As the commutator end nut is held stationary, this unscrews and is readily removed.

Signal Failures Still Decreasing in Chattanooga

A COMPARISON of signal failures for the Chattanooga Street Railway for the years 1919 and 1920 was given in last year's maintenance issue of the ELECTRIC RAILWAY JOURNAL, dated March, 19, 1921. Similar data for the year 1921 have now been made available through the annual report of the signal department. The accompanying table gives comparisons for the three years 1919, 1920 and 1921.

Trouble Found	1919	1920	1921
Line wires	8	13	5
Fuses blown	29	16	9
Lamps out	15	34	17
Relay trouble	24	22	13
Setting contactor	9	4	4
Restoring contactor	19	7	5
Bad grounds	9	7	6
Pole wiring	10	1	13
No trouble found	13	20	14
Miscellaneous	20	19	8
Totals	156	143	94

	1919	1920	1921
Total operations of all signals for year	1,745,950	1,709,820	1,759,300
Number of operations per failure	11,336	11,954	18,714
Average yearly operations of each block of signals	96,986	85,490	97,964
Average daily operations of each block of signals per day	264	276	240
Number of blocks in service	18	20	20

The original signals were installed some thirteen years ago and have been almost completely rebuilt, part of them in the manufacturer's factory, but most of them on the railway company's property, some few not yet having been completely rebuilt. Twenty blocks of Nachod signals are now in operation. In the first part of the table a comparison of the different kinds of signal trouble is given. It will be noted that there were only thirteen relay troubles resulting from the use of forty relays over the whole of last year. This is equivalent to one relay failure in about three years, which speaks well both for the signal design and maintenance. It will be noted that there was a decrease in all troubles except the one classed as "pole wiring," and this increase was partly caused by a different way of classifying this. Formerly troubles on wires leading from the contactor were classed as "contactor troubles," but now they appear more properly under the head of "pole wiring."

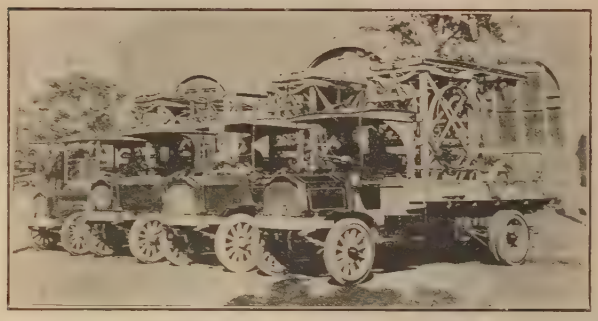
The number of operations per failure was increased

during the year 1921 to 18,714, which is a 35 per cent advance over the past year and about as good as can be hoped for, considering the reconstructed signals and the age of the lines. (A signal operation is here counted as that produced by a car moving under a contactor.) With new equipment throughout, this record might be bettered. There were 4.7 failures due to all causes per block per year, or a failure every 77.6 days.

During the year the signal department of the railway installed two Cheatham automatic switches and went over all the lightning arresters on the railway system, putting them in the best condition possible. The grounds were made of larger capacity than formerly, and an additional 7-ft. length of galvanized pipe was driven at each arrester. Eighty-seven arresters were installed, making a total of 228. On Missionary Ridge an iron casting was buried for the ground of each arrester.

A Fleet of Overhead Repair Trucks

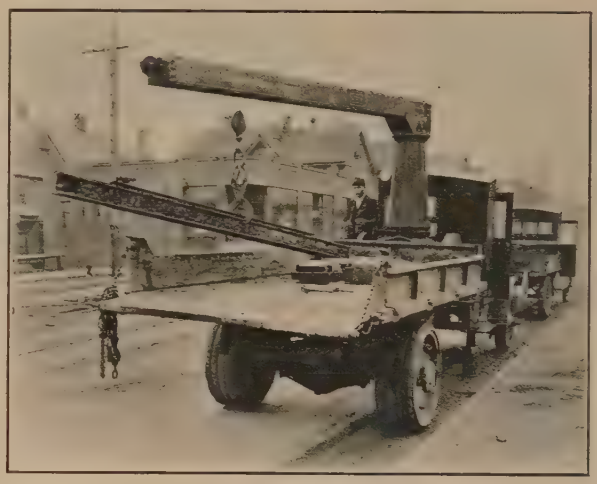
THE accompanying illustration shows a fleet of Packard chain-drive trucks equipped with overhead repair towers in service on the Third Avenue Railway System, New York. These towers are operated by hand



FLEET OF OVERHEAD REPAIR TOWERS

winches which elevate them approximately 20 ft. from the ground to the platform of the tower. The bodies are fitted with tool compartments, wire racks, etc., so that all necessary repair materials can be carried on the truck.

Handling Material with Truck Crane



CONVENIENT WAY DEPARTMENT CRANE TRUCK

THE Milwaukee Electric Railway & Light Company uses a Bay City heavy duty power crane mounted on a Packard truck for handling rails and other heavy railway material. The crane is operated by power taken from the trolley system and has a capacity of 6,000 lb. at 7½-ft. radius. The revolving of the crane base forward and reverse, the travel of the pulley block and lifting and lowering the pulley block are all controlled by shifting levers at the left of the driver's cab.

Tabulating Line Troubles

Memphis Keeps Comparative Records of Troubles Caused by Overhead Construction—Joint Use of Poles by the Utilities

ALL OVERHEAD line troubles are tabulated in Memphis so that the department of overhead lines can tell promptly and accurately exactly how much trouble each part of the overhead equipment has caused. This practice has been followed for a number of years, so that invaluable records have been obtained. The figures for 1919 and 1920 are given below. The corre-

THE MEMPHIS STREET RAILWAY
OVERHEAD LINE DEPARTMENT
Annual Report of Emergency Calls
1919

	Trolley Breaks	Trolley Hangers	Trolley Ears	Trolley Frogs	Trolley Sleeves	Spans	Pull Overs	Guys	Strains	Lig. Arresters	Light Circuits	Electric Switches	Poles and Fixtures	Miscellaneous	Total
January	3	17	3	0	0	1	6	2	0	1	1	3	1	8	46
February	5	6	5	0	0	3	2	0	0	0	1	3	1	10	36
March	3	10	6	1	0	6	4	1	1	0	6	3	1	10	54
April	1	17	4	0	0	2	0	1	2	0	6	9	2	5	49
May	4	13	7	0	0	4	7	2	1	1	2	8	3	8	60
June	1	25	8	0	0	6	4	5	3	0	10	5	0	12	79
Total for year	19	88	33	1	0	23	23	11	7	2	26	31	8	53	324
Same period last year	35	49	49	5	0	18	4	6	9	1	39	45	6	54	320
July	6	12	10	0	0	5	3	2	0	0	4	7	0	17	66
August	4	7	5	0	0	2	4	0	0	0	0	4	1	3	30
September	5	12	4	0	0	2	2	0	0	0	5	5	1	9	45
October	5	25	11	1	0	3	8	7	3	0	9	7	1	16	96
November	4	8	8	1	0	1	2	5	0	0	2	8	1	4	44
December	3	13	3	0	0	6	5	4	0	0	8	5	1	15	63
Total for year	27	77	41	2	0	19	24	18	3	0	28	36	5	64	344
Same period last year	22	73	19	2	0	10	22	8	1	3	17	21	2	47	247
Total for year	46	165	74	3	0	41	47	29	10	2	54	67	13	117	668
Total last year	57	122	68	7	0	28	26	14	10	4	56	66	8	101	567
Increase or decrease	11	43	6	4	0	13	21	15	0	2	2	1	5	16	101

THE MEMPHIS STREET RAILWAY
OVERHEAD LINE DEPARTMENT
Annual Report of Emergency Calls
1920

	Trolley Breaks	Trolley Hangers	Trolley Ears	Trolley Frogs	Trolley Sleeves	Spans	Pull Overs	Guys	Strains	Lig. Arresters	Light Circuits	Electric Switches	Poles and Fixtures	Miscellaneous	Total
January	5	14	8	1	0	4	1	3	3	0	7	5	0	7	58
February	5	1	8	0	0	4	2	1	1	0	5	3	0	7	37
March	7	6	4	0	0	4	6	2	1	0	2	8	2	18	60
April	2	10	8	1	0	5	4	1	1	0	3	5	1	8	49
May	0	24	19	0	0	5	4	5	2	0	5	8	4	14	90
June	3	24	17	0	0	4	3	1	3	1	2	7	2	6	73
Total for year	22	79	64	2	0	26	20	13	11	1	24	36	9	50	367
Same period last year	19	88	33	1	0	22	23	11	7	2	26	31	8	53	324
July	5	17	17	0	0	4	5	5	2	0	4	6	1	12	78
August	11	17	9	0	0	7	5	2	0	0	2	10	5	5	73
September	3	9	14	1	0	10	10	2	1	0	1	12	2	17	82
October	10	5	14	0	0	3	2	2	2	0	1	17	5	12	73
November	9	6	9	0	0	2	6	4	1	1	5	13	2	10	68
December	2	4	2	0	0	4	3	7	0	0	14	10	1	12	59
Total for year	40	58	65	1	0	30	31	22	6	1	27	68	15	68	433
Same period last year	27	77	41	2	0	19	24	18	3	0	28	36	5	64	344
Total for year	62	137	129	3	0	56	51	35	17	2	51	104	25	118	800
Total last year	46	165	74	3	0	41	47	29	10	2	54	67	13	117	668
Increase or decrease	16	28	55	0	0	15	4	6	7	0	3	37	12	1	132

Form 998 **The Memphis Street Railway Company**

OVERHEAD LINE DEPARTMENT

EMERGENCY REPORT

Date Jan 14 1922

LINE Jefferson St. ON (Inbound / Outbound) TRACK

LOCATION Jefferson & Main

TROUBLE REPORTED Trolley jumping

REPORTED BY Wilkerson TIME 11.30 A.M. / P.M.

BY J. Tarr

REPORT OF EMERGENCY CREW

TROUBLE FOUND Frog out of line

CAUSE OF TROUBLE

LOCATION Main and Jefferson ON (Inbound / Outbound) TRACK

WORK DONE Lining up frog

MATERIAL USED 25 ft. 1/4" galvanized iron wire

LINE OPEN 12.30 A.M. / P.M. TIME REPAIRS COMPLETED 2.00 A.M. / P.M.

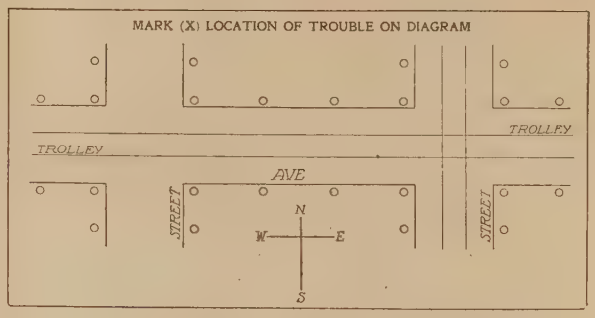
REMARKS

Atkins FOREMAN

NOTE:—EMERGENCY CREW WILL MARK LOCATION OF TROUBLE ON DIAGRAM ON REVERSE SIDE OF THIS REPORT

(OVER)

REPORT OF TROUBLE AND RECORD OF MATERIALS USED AND TIME TAKEN IN REPAIRS



REVERSE SIDE OF LINE DEPARTMENT REPORT

sponding figures for 1921 are given at the foot of this column. Decreases are shown by italics.

These tables are made up from daily reports and these in turn from the reports made by the emergency crews to the overhead line department. When repairs are made a typical case will be followed out.

A report is received by telephone from a transportation department inspector that trolleys jump at the corner of Jefferson and Main Streets on the Jefferson Street line, outbound track. This is recorded on the upper part of the accompanying blank. On the lower part of the blank the foreman reports how and when he cared for the trouble, the material used and the time taken to make the repair. On the back of this report is space to enter on a printed diagram, if desired, the location of the trouble. From these reports a monthly table, by days, is prepared. The upper part of the blank used for this purpose is shown.

THE MEMPHIS STREET RAILWAY
OVERHEAD LINE DEPARTMENT
Annual Report of Emergency Calls
1921

	Trolley Breaks	Trolley Hangers	Trolley Ears	Trolley Frogs	Trolley Sleeves	Spans	Pull Overs	Guys	Strains	Ltg. Arresters	Light Circuits	Electric Switches	Poles and Fixtures	Miscellaneous	Total
January	4	8	5	0	0	4	8	2	0	0	4	4	0	7	46
February	4	5	4	0	0	1	3	1	0	0	8	11	0	9	46
March	*1*	7	4	0	0	7	6	4	2	0	8	8	2	9	58
April	3	10	2	0	0	8	7	3	0	0	6	8	3	8	58
May	3	12	10	0	0	4	3	2	0	0	6	9	1	12	62
June	2	8	*7*	0	0	8	7	2	0	0	*1*	4	6	10	55
Total for year	17	50	32	0	0	32	34	14	*2*	0	33	44	12	55	325
Same period last year	22	79	64	2	0	26	20	13	11	1	24	36	9	60	367
July	6	9	10	0	0	*6*	*6*	*2*	*1*	0	*3*	*6*	*2*	11	*62*
August	3	5	5	0	0	11	4	3	2	0	4	6	3	10	58
September	6	1	4	0	0	*3*	*2*	4	0	0	*6*	*4*	*2*	*9*	*41*
October	1	3	6	0	0	4	1	4	1	0	10	5	1	14	50
November	2	8	2	0	0	*3*	1	1	1	0	*9*	*2*	1	*7*	*37*
December	1	19	2	1	0	*2*	4	0	1	0	8	5	0	4	38
Total for year	19	36	29	1	0	29	18	15	*7*	0	40	28	9	55	286
Same period last year	40	58	65	1	0	30	31	22	6	1	27	68	16	68	433
Total for year	36	86	61	1	0	61	52	29	9	0	73	72	21	110	611
Total last year	62	137	129	3	0	56	51	35	17	2	51	104	25	128	800
Increase or decrease	*26*	*51*	*68*	*2*	0	*55*	*1*	*6*	*8*	*2*	*23*	*32*	*4*	*18*	*189*

THE MEMPHIS STREET RAILWAY
Monthly Report of Emergency Calls

MONTH OF.....192

Date	Trolley Breaks	Trolley Hangers	Trolley Ears	Trolley Frogs	Trolley Sleeves	Spans	Pull Overs	Guys	Strains	Ltg. Arresters	Light Circuits	Electric Switches	Poles and Fixtures	Miscellaneous	Total
1															
2															
3															
4															
5															
6															
7															

FORM OF DAILY REPORT

The headquarters of the overhead line department are at the main carhouse on Beale Avenue, and it is here that the emergency line crews are stationed.

JOINT USE OF POLES

For some fourteen years the utilities in Memphis have joined in the use of poles to a considerable extent. It is the practice to carry on one side of the street the power cables and the railway feeders, the former over the latter and both above the span connection. On the other side of the street are the telephone wires and telegraph wires. Each company naturally cares for repairs and renewals of its own equipment, but they join in the renewal of poles.

The practice in this respect is for the line department in each company to make a joint inspection in the early spring to determine which poles need replacement, then to divide between the several companies the number of poles to be replaced. An effort is made in this division to assign the poles to be replaced in one part of the city to one company; those in another part of the city to the second company, etc. In this way construction costs are reduced. Each company naturally transfers its own attachments from the old pole to the new.

Handling Cars Inside Shops

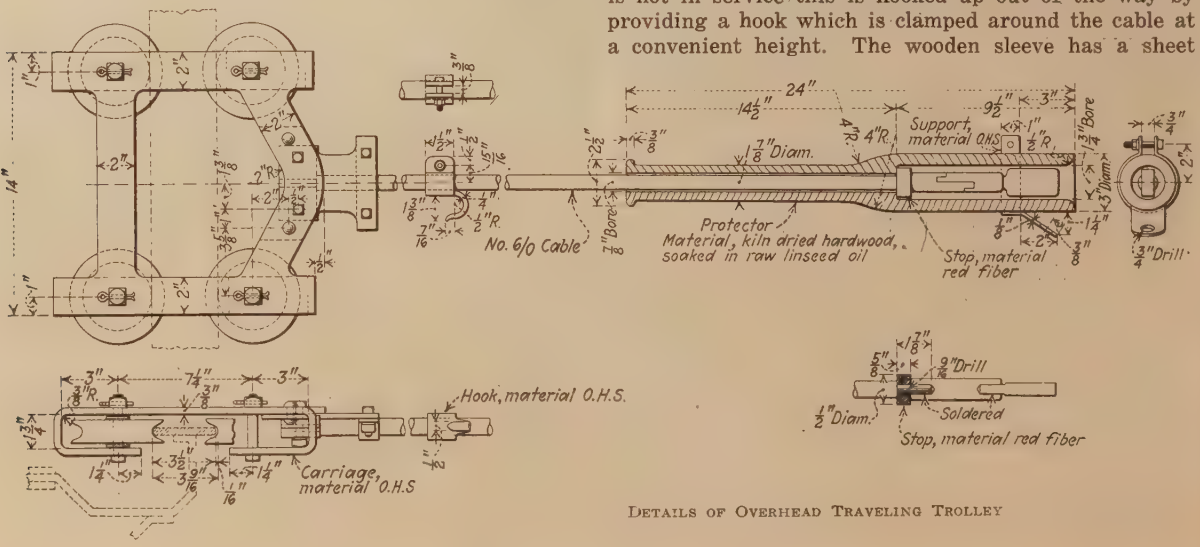
For Cars Not Equipped with Trolleys Some Form of Overhead Trolley System Is Quite Necessary to Safeguard Employees from Accident

ELECTRIC railways using the third-rail contact system have a somewhat inconvenient problem to solve to provide for shifting equipment inside the shop. The third rail installed in such places is a continual source of danger to workmen and the use of switching locomotives or working cars equipped with trolleys for moving cars is a great inconvenience as well as being costly. On some systems the third rail is laid in the yard up to the entrance of the shop, and no contact system is provided inside the buildings themselves. In placing a car or train over the pits it is the practice to get up sufficient speed on entering so as to be able to coast into position. In removing cars at such shops it is a common practice to use a long jumper which can be held on the third rail outside the shop while the other end is held on the contact shoe of the car to be moved, or where train operation is used the head car of the train is used with the jumper to pull out the remainder of the train. This system, however, has an element of danger in that proper care is not always exercised by workmen in attaching the contact to the third rail or in holding the other end on the contact shoe of the car to be moved. Serious burning and flashing of the employees have resulted in many cases. Where shops are long this method cannot be used, as it is frequently necessary to move a car at the back of the shop, and in this case an exceedingly long jumper would be necessary.

Accompanying illustrations show a form of overhead traveling trolley used by the Brooklyn Rapid Transit Company in its shops. This employs an overhead iron framework, insulated, so that this forms the source of power. A carriage with four contact wheels runs along this contact system with a flexible cable and protected contact on the end of sufficient length to reach to the contact shoes of the cars to be moved. The framework of the carriage is constructed of ⅜-in. strap iron with a terminal and clamp at the bottom to receive and hold the cable. A well-insulated cable of flexible construction is used for conducting the current. In addition to the rubber insulation either a double or triple braid is quite essential to insure long life and prevent injury.

OVERHEAD TRAVELING TROLLEY SYSTEM IN BROOKLYN RAPID TRANSIT COMPANY'S SHOPS

The bottom contact is connected to the cable through a standard knuckle joint connector so that this can be replaced or renewed whenever necessary. As a protection for this bottom contact a wooden sleeve is used. This is made of kiln-dried hardwood, which has been soaked in raw linseed oil. The upper end of this is provided with a hole to receive the cable and the bottom end is enlarged so as to receive the terminal and knuckle joint connector. A stop of red fiber fits over the end of the cable just above the knuckle joint connector and prevents the wooden sleeve from dropping off. When hanging down this protects all parts of the contact and when making contact with the third rail shoe on the car to be moved this slips up on the cable so as to expose the lower end of the contact. The workman is thus effectively protected at all times and there is no danger of his coming in contact with live parts. When the contact is not in service this is hooked up out of the way by providing a hook which is clamped around the cable at a convenient height. The wooden sleeve has a sheet

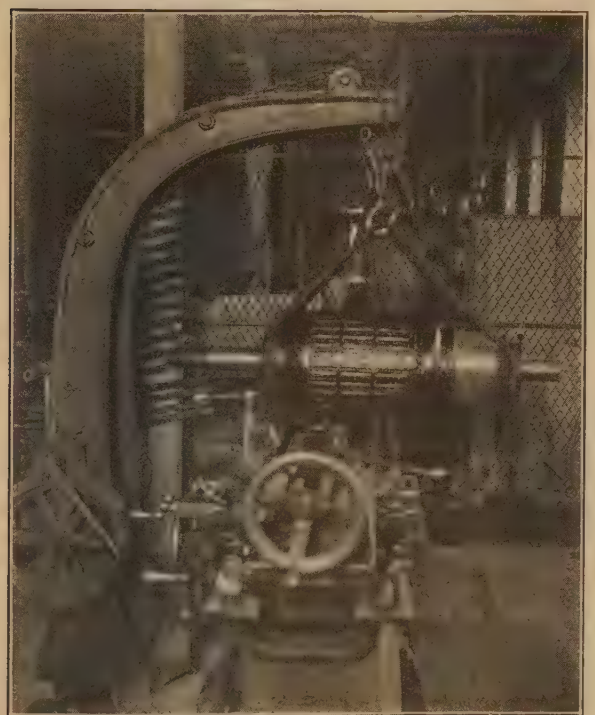


DETAILS OF OVERHEAD TRAVELING TROLLEY

steel clamp with a hole so as to fit over the hook on the cable. Details of construction of the carriage, the cable and the bottom protection are shown in one of the accompanying illustrations. Another shows its use in one of the shops of the Brooklyn Rapid Transit Company.

Serving Shop Machines with a Portable Crane

IN SHOPS which have line shafting and belts it is often very difficult to provide overhead traveling trolleys or cranes for handling heavy work in and out of the various shop machines. Even where other material handling equipment is available, a portable crane will be found a great labor and time saving piece of equipment. The accompanying illustration shows a Canton Foundry & Machine Company's No. 3 portable floor crane and hoist serving a lathe in the shop of the Eighth Avenue Railroad, New York City. One man and this type of crane handle the job of putting an armature in position for turning the commutator with perfect ease. This crane serves the larger machine tools, such as drill press, boring mill and lathe, and handles the heavier equipment parts such as armatures, motor shells, truck frames and the like. With the older hand method of lifting these parts from three to six men were necessary, so that often high-priced machinists were taken from their work to help in a tiring and unattractive operation. If a saving of 75 cents per day results in labor from the use of such a portable crane, this would amount to $19.50 each month of twenty-six days, or



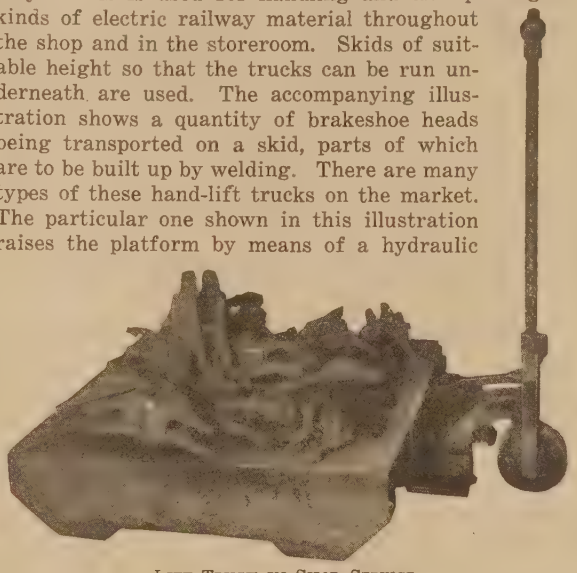
HANDLING A RAILWAY ARMATURE WITH PORTABLE FLOOR CRANE

$234 per year. In addition to this saving there would also be a loss of production with different machines standing idle while their operators are assisting in lifting a piece of apparatus.

The crane shown has a total height of 7 ft. 6 in., a lift of 6 ft. 4 in. and a lifting capacity of 5,000 lb.

Lift Trucks Are Handy Equipment for Railway Shops

THE accompanying illustration shows a lift truck in the shops of the Eighth Avenue Railroad, New York City. This is used for handling and transporting all kinds of electric railway material throughout the shop and in the storeroom. Skids of suitable height so that the trucks can be run underneath are used. The accompanying illustration shows a quantity of brakeshoe heads being transported on a skid, parts of which are to be built up by welding. There are many types of these hand-lift trucks on the market. The particular one shown in this illustration raises the platform by means of a hydraulic

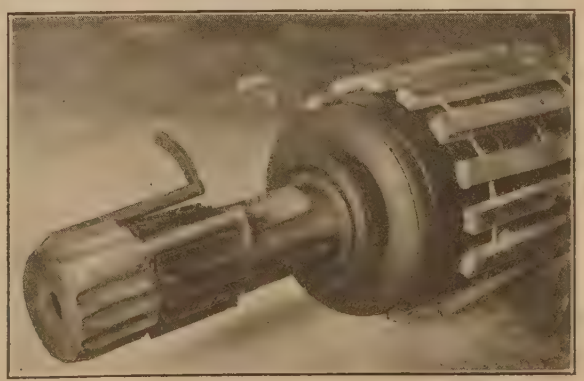


LIFT TRUCK IN SHOP SERVICE

cylinder. The lifting is accomplished by moving the handle backward and forward. When not in use, the handle is held by a catch in the upright position so that it cannot drop to the floor and is always in easy reach of the operator. The truck can be moved and steered with the handle in the upright position if found necessary in close quarters. Different heights of lift are available as are found necessary to clear different shop obstructions. The pressing of a pedal operates a hydraulic release and lets the load settle gently to the floor. The handle does not engage the angle iron frame, so that when the load is released there is no tendency for the handle to fly up and injure the operator.

Tool for Making Pinion Installation a One-Man Job

SOMETIMES shop operations which ordinarily require the services of two or more men can be readily carried out by a single worker by the aid of a few inexpensive special tools. In installing pinions on an armature shaft it is usually necessary to use a sledge and



THIS DEVICE ENABLES ONE MAN TO INSTALL PINION

block to force the pinion into position, even though it has been previously heated so that it will go on without difficulty. The usual method would require the services of two men, one to swing the sledge and the other to hold something against the end of the pinion so as to prevent injury. The accompanying illustration shows a simple device used by the Eighth Avenue Railroad, New York, N. Y., which enables this operation to be done by one man. The device is made from an obsolete pinion and has two round prongs which extend inward and fit into the teeth of the pinion which is being installed. At the inside end of these rods are two dogs which drop into position around the shaft and hold the tool firmly so that it will not fall off even though a glancing blow is struck. The rods are welded to the face of the old pinion and the bore has been enlarged sufficiently so that it will go around the shaft without difficulty.

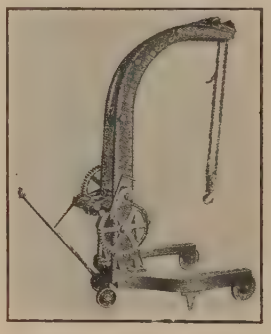
Why Old Railroad Ties Are Burned

THE question as to why worn-out crossties are burned by railroads instead of allowing people to take them for fuel has been answered by Samuel Porcher, general purchasing agent of the Pennsylvania Railroad, in which he states that efforts have been made to interest dealers in firewood in buying the old ties, but thus far without much success. The causes appear to be that the old ties are often dirty; that they contain stone, grit and slag wedged in the cracks which might injure the saws used in cutting them; that in many cases they are partly decayed; that they are dried out and that their fiber is more or less crushed, so that they burn out quickly. For these reasons dealers have been unwilling to pay the railroad company enough to cover the cost of collecting the ties and delivering them to a point at which they could be removed.

Efforts have also been made to dispose of old ties in such ways as for wood pulp purposes, for extraction of chemicals, for burning and sale of the ashes for fertilizer, and for manufacture into charcoal, but without success.

Some ties have been sold to purchasers living on or near the right of way who buy them at nominal prices, usually at from 10 to 15 cents apiece. Such means of disposal is practicable only where the ties can be delivered at a public crossing or other points so that they can be obtained safely by the user and where the cost of delivering them is not greater than the nominal prices obtainable. The company feels that it cannot allow the public to go promiscuously over its tracks and through the yards to gather up old ties, as this would be practically letting down the bars against trespassing on the tracks, an evil against which the Pennsylvania Railroad has struggled for years and which has been the cause of about half of the fatal accidents on railroads in the United States.

Back-Geared Portable Crane and Hoist



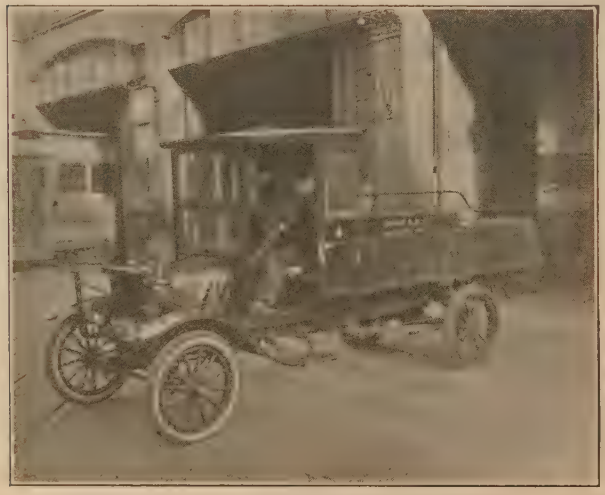
DOUBLE GEARED PORTABLE CRANE AND HOIST

FOR handling loads in excess of 4,000 lb., the Canton Foundry & Machine Company, Canton, Ohio, have recently brought out a double-geared portable crane and hoist. As both shafts are squared to receive the lifting cranks, the load can be lifted on either the single or the back gear. When handling light work and where speed is desirable, lifting should be done on the single gear, but when ease of operation is desired with heavier loads, the double gear should be used for lifting. The various sizes manufactured can be furnished with this additional equipment.

Light-Weight Trucks Prove a Convenient Electric Railway Accessory

ACCOMPANYING illustrations show two light-weight trucks constructed on Ford chassis by the Second Avenue Railroad, New York, N. Y. Truck No. 4 was built essentially for transporting tools used by the electrical department while making repairs in the underground conduit system. There are four brackets on each side of the car body which are used for carrying channel rails. Convenient bins and tool boxes are provided along the sides and back of the driver's cab which can be locked. The tops of the bins have flat covers which are used for seats and the pipe railing along the sides are found very convenient.

The No. 5 truck, also built in the shops of the company, on a Ford chassis is a dump truck. This is convenient for cleaning out the underground conduit slot.

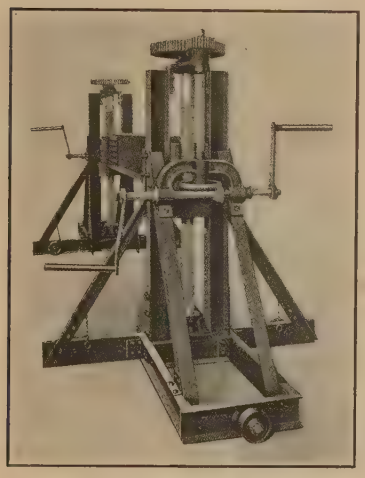


AT LEFT, TRUCK USED BY THE ELECTRICAL DEPARTMENT. AT RIGHT, DUMP TRUCK USED FOR CLEANING OUT UNDERGROUND SLOT

What's New from the Manufacturers

A Portable Hoist for Shop Use

A TYPE of portable shop hoist has been placed on the market by Fox Brothers & Company, New York City, for use in shops which are not fitted with overhead traveling crane equipment or in places which are inaccessible to cranes, or for use while cranes are in use handling other parts.



PORTABLE SHOP HOIST FOR RAISING CARS

A complete equipment consists of four separate jacks and two cross girders. Each jack is mounted on cast-iron wheels with flat treads so that they can be moved from place to place with little effort. These wheels revolve on shafts attached to eccentric bearings, held in place by pins. When the jacks are in position the pins are removed from the bearings, allowing the wheels to rise and the entire base of the jack to rest on the shop floor. The framework is constructed of structural steel shapes and the members are strongly riveted together with gusset plates. Each jack is operated by a pair of handles which turn a shaft on which is mounted a miter gear, which transfers power to a bevel-gear shaft, at the upper end of which is attached a pinion meshing with a large spur gear keyed to the main screw. When this screw is revolved it raises and lowers the nut or raising block. When the hoist is in its lowered position the cross girders are 2 ft. 8 in. from the floor level. They can be raised to the extreme height of 6 ft. 3 in., giving a total movement of 3 ft. 7 in. The working capacity is 30 tons.

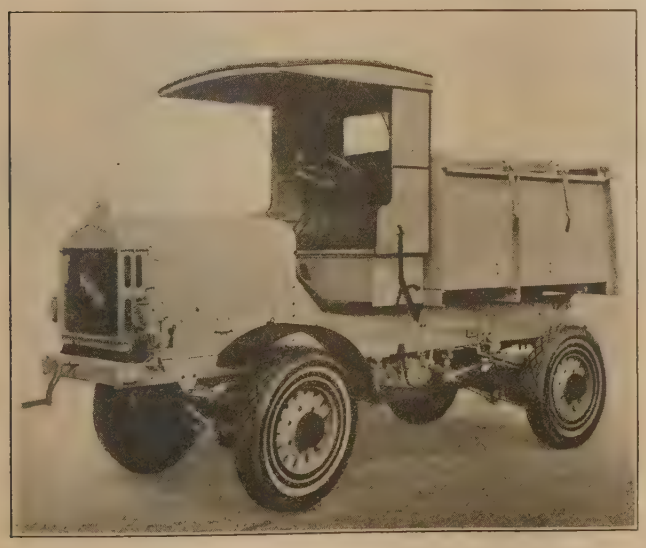
Convenient Truck for Way Department

A RECENT type of truck for road building has been placed on the market by the Four Wheel Drive Auto Company of Clintonville, Wis. This type of truck has an extremely short wheelbase of 105 in., which gives it an exceptionally short turning radius—sometimes very essential on work of electric railways. This truck is designed to carry a three-batch load of 3 tons capacity. The body is operated by a horizontal hydraulic hoist and the tail gates can be opened individually. The truck is also designed to be used as a tractor for trailing loads to the concrete mixers and for hauling road machinery. Some of the governing dimensions are given in the accompanying table.

DIMENSIONS AND CAPACITY OF TRUCK FOR ROAD CONSTRUCTION

Capacity	6,000 lb.
Allowance for body and hoist	2,400 lb.
Weight of chassis with pressed-on tires	6,175 lb.
Wheel base	105 in.
Tread, front and rear	60 in.
Turning radius	20 ft. 6 in.
Speed	15 m.p.h.
Wheels and tires	36 in. x 7 in. front 46 in. x 8 in. rear
Clearance under lowest part of axle	9 11/16 in.
Clearance under transmission	15 in.
Length of frame	166 in.
Total over-all length of car including starting crank	181 in.
Width of frame	36 in.
Total width of chassis over hub cap	74½ in.
Capacity of gasoline tank	20 gal.
Motor	Wisconsin, 4-cycle, 4-cylinder, 4¼ in. bore, 5½ in. stroke

Three speeds forward and one reverse are provided. Beginning with the transmission the speed is gradually reduced. The transmission has a reduction of 4 to 1 low speed, 2 to 1 second speed, 4.13 to 1 reverse speed and a direct speed of 1 to 1 on high. The second reduction of speed is made in the sub-transmission of a silent gear drive, having a driving pinion with fifteen teeth and a driven pinion containing the center differential of thirty-one teeth, making a reduction of 2.06 to 1. The third and final reduction is made on a differential of the rear and front axles, having a reduction of 4.30



AT LEFT, SIDE VIEW OF TRUCK FOR ROAD CONSTRUCTION. AT RIGHT, BODY HOISTED TO DISCHARGE POSITION

to 1, making the total reduction as follows: 35.6 to 1 on low speed, 17.8 to 1 on second speed, 36.7 to 1 on reverse speed, and 8.9 to 1 on high speed.

The springs are made of alloy steel, semi-elliptic front and platform spring rear. The drive is taken through the springs. Torsion rods are provided to take up the torque of the axles.

New Conveyor a Labor Saver

A NEW type of portable self-propelled belt conveyor has recently been placed on the market by the Barber-Greene Company, Aurora, Ill. It is called the B-G U-Belt Loader and its new features include self-feeding, self-propelling and one-man control. It is being furnished in two sizes with 12-in. and 18-in. U belts. The 12-in. model has a capacity of 50 tons of coal per hour, or 70 tons of sand and gravel per hour. The 18-in. model has a capacity of 75 tons of coal per hour, or 100 tons of sand and gravel per hour. Either

LOADING COAL FROM A PILE INTO A WAGON

gasoline motor or electric motor drive is furnished as desired. The belt consists of a special four-ply, ⅛-in. rubber-covered belt, flanged on the side with steel overlapping clips and cupped flights across the belt every 18 in. Cast-iron shoes support the belt on its return. An adjustable spout is furnished with each machine and a wire dust screen, with mesh to suit conditions, is furnished as an extra.

This is essentially a one-man machine, and a single operator can load trucks or wagons and transport the machine from one location to another. One man can load mine-run Pocahontas coal from a storage pile into a truck or wagon at the rate of 5 tons in seven minutes.

Trolley Wheel with Stationary Guide Flanges

TROLLEY WHEEL WITH STATIONARY FLANGES

THE H. H. Trolley Supply Company, Cleveland, Ohio, has recently brought out a new type of trolley wheel with steel guide flanges on the outside which prevent fouling on wires. It is claimed that much of the trouble from wheels leaving the wire is due to a tendency for them to roll off and that the stationary guide flanges assist the wheel in maintaining its grip upon the wire. The two guide flanges are made from cold-rolled steel stampings, which are retreated to prevent wearing of the sides of the trolley wire. These flanges are interchangeable, giving eight different wearing positions. In the construction of the rotating parts, especial care is taken to insure proper balance and true rotation of the wheel upon its axis.

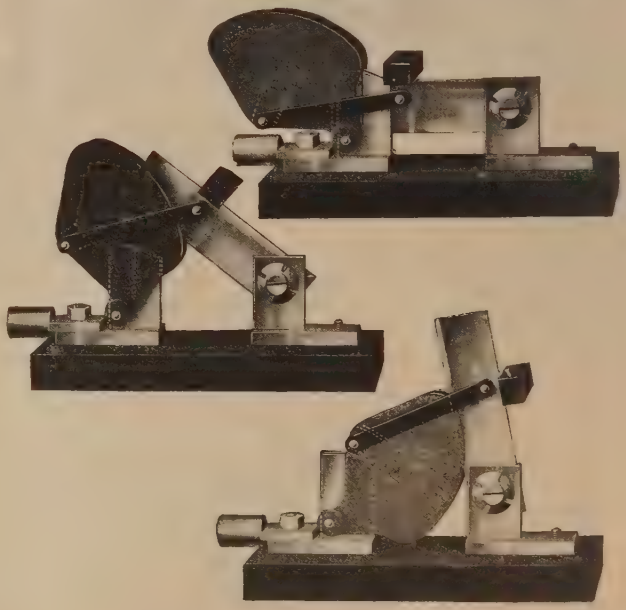
New Piston Packing Ring

CIRCULAR EXPANSION PISTON RINGS

THE accompanying illustration shows the details of construction of the Zelnicker Ever-Tyte Piston Ring. The type of construction provides for a three-point expansion and a right-angle interlock to insure tightness. The manufacturers claim that the use of these rings makes the reboring of round cylinders unnecessary. These piston rings are furnished by the Walter A. Zelnicker Supply Company, St. Louis, Mo.

600-Volt Switches with Protecting Barriers

ACCOMPANYING illustrations show the Snuf-arc type of 600-volt knife switch being introduced by the Trumbull Electric Manufacturing Company, Plainville, Conn. This switch is of the usual construction except that it has a swinging molded barrier on each of the contact jaw posts. This hinged barrier is operated by an insulated connecting rod attached to each blade in such a way that when the blade leaves the jaw posts



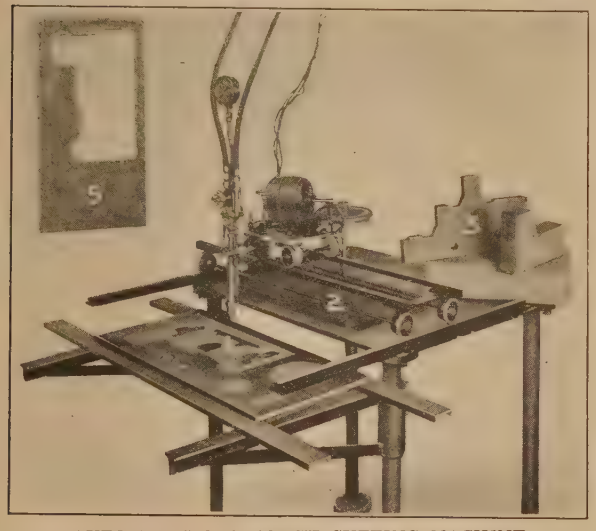
OPERATION OF MOLDED BARRIER FOR SWITCHES. TOP, BLADE IN CONTACT. CENTER, BLADE BREAKING CONTACT. BOTTOM, CIRCUIT OPEN

the barrier swings between the breaking points. The arc is thus effectively extinguished without danger of side flare.

The barriers used are substantially made of fireproof insulating material molded into one piece. A heavy center piece swings closely over the contact jaw post, and two wide flat side sections inclose each side of the jaw post and the end of the blade. The center piece stretches and breaks the arc, while the side sections prevent the side flare and the spreading of the arc to adjoining posts or to the sides of the inclosing cabinets.

New Automatic Torch Cutting Machine

THE General Welding & Equipment Company, Boston, Mass., is marketing a new automatic gas torch cutting machine. The equipment is mounted on two carriages, the upper one having four wheels running on a track and the lower carriage also having four wheels running on a track at right angles to the upper one. The operation of the two carriages is similar to that of a traveling crane, and with the gas torch mounted on the upper carriage it will cover any point in a horizontal plane within the capacity of the machine. The cutting torch is mounted on one side of the upper



AUTOMATIC GAS TORCH CUTTING MACHINE

1—Steel plate with various shapes cut out. 2—Fiber template with pattern for No. 1. 3—Die for trimming crankshafts. 4—Part of trimming die cut out of 2-in. armor plate. 5—Steel plate showing trimming die cut out.

carriage with a torch adjuster, while on the opposite side is mounted the driving and tracing system. As the torch and tracing mechanism are mounted on the same carriage, they are rigidly connected.

The driving and tracing mechanism is carried by a shaft which causes the cutting parts to follow a definite path. The shaft is provided with four driving pins which follow in slots of the driving members slipped loosely over the shaft. The driving member rests on the inclined edge of the template partly through its own weight and with the additional pressure of an adjustable spring. The conical end is knurled and hardened so as to insure a reliable frictional driving engagement with the inclined face. The shaft also carries the small, highly-polished tracing roller, slipped loosely over a small pin at the lower end of the shaft. This roller fits loosely in the polished groove of the lower part of the template.

When the shaft is rotated, the driving member will run along the inclined face of the template, pressing at the same time the polished tracer roller against the polished face of the groove. The driving member and tracing roller are thus kept in constant engagement with their respective template faces, which insures uniform speed. The speed can be regulated either electrically by a rheostat or mechanically by changing the position on a friction wheel on a friction disk or by both.

Among the advantages claimed for the mechanical drive are that all possible irregularities and vibrations of the driving member are up and down and cannot affect the smooth running of the tracer and the machine, which operates in another plane and is guided by a polished tracer, pressed on a polished face. A smooth and uniform movement is thus obtained which enables the cutting torch to produce smooth and accurate cuts. The equipment is being furnished in two standard sizes with cutting ranges of 12 in. x 12 in. and 24 in. x 24 in.

Unique Application of Electric Traveling Crane

A RATHER unusual application of a traveling crane as a labor-saving device is used at the power plant of the Union Gas & Electric Company of Cincinnati, Ohio, which furnishes power to the South Covington & Cincinnati Street Railway Company. This crane serves as a dredge for an intake well of river water for cooling turbo-generator condensers. Water is supplied from the Ohio River to the intake well through tunnels, and is first cleared of water-logged débris and silt by means of a heavy bar iron grill. The crane is used in connection with the removing of this débris and silt from the bottom of the well. A grab bucket operated by the crane takes up the refuse and deposits it into a hopper. The grab bucket is often called upon to remove heavy water-logged objects.

The intake well has the shape of a sector of a circle. The crane spans the well radially, having one end truck pivoted at the center of the circle, while the other end travels on a circular track at the outside edge of the well. This truck is fastened directly to the floor at this level, and a pipe railing is provided around the crane and the operating mechanism of the traveling screens as a safety measure. The crane trolley with its suspended bucket travels along the entire length of the crane bridge or as far in toward the center of the circle as efficient operation of the bucket will permit. The operator's cab is fastened to this trolley and extends above the top of the bridge girders in such a manner as to give the operator an unobstructed view.

TRAVELING CRANE USED TO REMOVE REFUSE FROM INTAKE WELL

The installation was made according to specifications issued by Sargent & Lundy of Chicago, and the crane was built by the Whiting Corporation of Harvey, Ill. The span of the crane is 49 ft. 10 in. and the trolley is designed for a lift of 100 ft. of the grab bucket, which is of ¾ cu.yd. capacity. Two motors of 7½ hp. operate the bridge and trolley travel respectively, and two 45-hp. motors operate the bucket hoist.

Combination Track Grinder and Drill

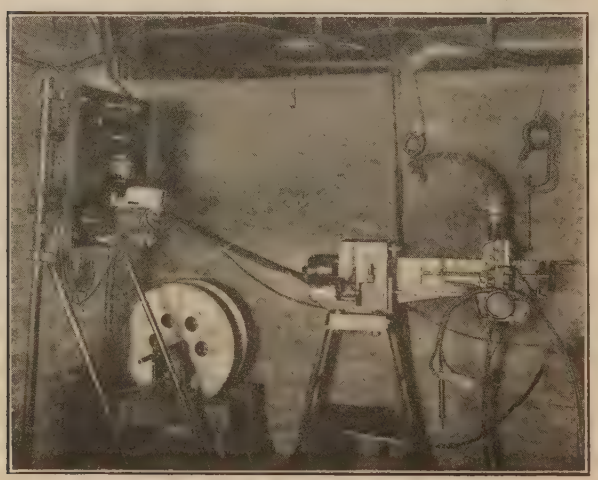
THE accompanying illustration shows a Stow electric railway track grinder in operation in Providence, R. I. The equipment consists of a multispeed motor mounted on a small truck and connected to the grinding wheel by a flexible shaft. This arrangement provides

GRINDING TRACK IN PROVIDENCE R. I.

a grinder which is easily handled and can be used in heavy traffic centers without danger of interfering with traffic. The same equipment can be used for track drilling operations by removing the grinder and substituting a drill attachment. The motors used are compound wound and both dust and moisture proof. The change in speed is accomplished by varying the air gap in the center of the pole while the density is maintained at the pole tip. Motors are furnished in sizes of from ¾ to 3 hp. and with wheels in size 6 in. x 1 in. up to 12 in. x 2 in. This equipment is built by the Stow Manufacturing Company, Inc., Binghamton, N. Y.

Semi-Automatic Arc-Welding Outfit Increases Production

THE Third Avenue Railway, New York City, has recently installed in its Sixty-fifth Street car shop a General Electric semi-automatic electric arc welder shown in the accompanying photograph, which is at the present time being used to build up motor axle bearing housings. While the installation of this machine at the present time is of a temporary nature, the company has been able to increase the production of this class of work 25 per cent over ordinary hand welding. The company hopes to be able to increase its production 50 per cent or more when the apparatus is permanently installed and the operator has become thoroughly familiar with its operation.



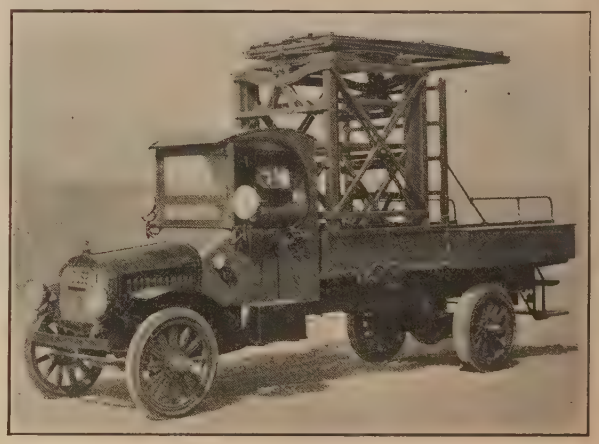
SEMI-AUTOMATIC WELDER IN THIRD AVENUE RAILWAY SHOP

The use of this machine does not require the services of a skilled arc-welding operator as the average mechanic can obtain good results from it after one or two days' operation. The arc length which governs the quality of all electric arc welding is electrically and mechanically controlled and is not subject to the variations of hand welding. This results in a better and more uniform quality of deposited metal. Another advantage with this type of apparatus is that the electrode material is fed continuously from a reel instead of being cut in short lengths as in hand welding, eliminating the necessity of frequent changing of electrodes and the waste of the stub ends.

This apparatus can be used for building up any worn surfaces, welding tanks and almost any arc welding that is now being done by the hand process. This apparatus is also used for welding complicated parts in production work where it is not feasible to use an automatic welder due to the difficulty of providing the necessary jigs and feeding mechanisms required for the automatic machine.

Overhead Tower Truck Used in Little Rock

THE Little Rock Railway & Electric Company uses a two-ton Mack truck with a Trenton three-section tower in connection with its overhead maintenance repairs. The truck has a 162-in. wheelbase and the wheels are equipped with solid tires. The Trenton tower is

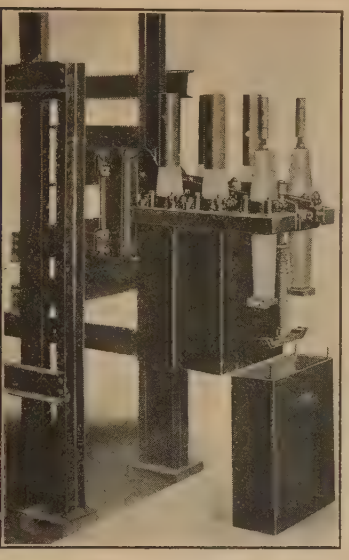


THREE-SECTION TOWER TRUCK IN LITTLE ROCK

12 ft. 2 in. from the ground to the platform in its down position and 18 ft. 4 in. when raised. The space inside the body is used for carrying wire, tools, etc., and a special wire rack is constructed at the back of the tower, which uses S hooks to hold the coils of wire.

Tool boxes are provided on each side and these are constructed so that the sides fold down and act as a shelf for use while repairs are being made. Searchlamps are installed at the front and are mounted on a double hinge, so that they can be directed in any direction. A box is provided inside the driver's cab for a 30-ft. extension cord, which can be plugged in on the dash to provide light at the point where work is being done at night. A complete electric starting and lighting system is installed as part of the chassis equipment.

Quick Break Oil Circuit Breaker



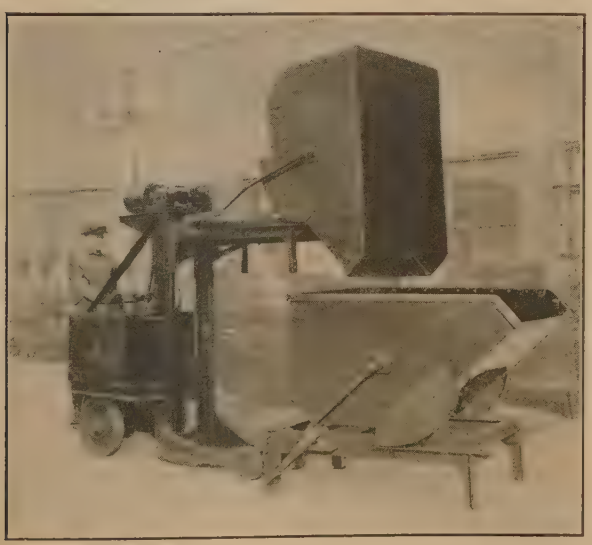
NEW TYPE OF CIRCUIT BREAKER

THE Condit Electrical Manufacturing Company has just brought out the type D-22 oil circuit breaker. This incorporates some of the principles used in its present type D-12. These include a strong tank rigidly supported at four points on the frame and a rigid frame construction to insure contact alignment. High-speed operation is obtained from a steel mechanism assisted by accelerating springs placed on each brush rod. Standard arcing tips are used on both stationary and movable contacts. The type D-22 oil circuit breaker is furnished for either hand or electrical operation in sizes up to and including 1,200 amp. for 15,000-volt service.

New End Dump Skid for Use with Platform Trucks

TO FACILITATE the handling by an elevating platform truck of such materials as ashes, coal, sand, gravel and the like, the Lakewood Engineering Company, Cleveland, Ohio, is marketing an end-dumping body skid, with steel framework and steel legs. It also has a similar side-dumping skid. These are particularly useful for loading bulk materials and transporting to bins, motor truck bodies, cars, storage piles and the like.

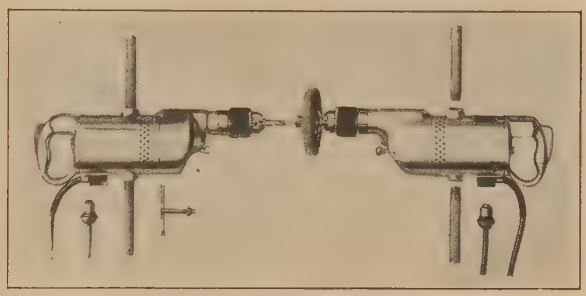
The skids may be set down anywhere in the shops or yards for loading and when filled a platform lift truck can pick up the skid and transport it to the desired point. The dumping is controlled by levers on either side of the body. The studded rocker and holes in the rocker race insure accurate alignment. The capacity of the end dump body is 27 cu.ft. and is limited to 100 lb. per cu.ft. The level capacity of the side dump is 18 cu.ft. The weight of load is limited to 3,000 lb.



PICK UP AND DUMP POSITION OF BODY SKID

Combination Electric Drill and Grinder

A NEW tool for use in shops where hand drilling and grinding operations are performed infrequently and where the purchase of separate machines is not warranted has been marketed by the Wodack Electric Tool Corporation, Chicago, Ill. The combination tool has a drilling capacity in steel of from $\frac{1}{8}$ in. to $\frac{5}{8}$ in. holes and when used as a grinder carries a 6-in. x $\frac{3}{4}$-in. grinding wheel. Two separate speeds are provided, the slow speed for drilling and the high speed for grinding. The complete weight of the tool is 18 lb. and the motor develops $\frac{1}{2}$ hp. under load. A switch located in the top handle is a quick make and break automatic stop type, which insures the operator having the tool under control at all times. Aluminum castings and ball bearings are used throughout.



PORTABLE ELECTRIC DRILL AND GRINDER

An Illuminated Station Sign

THE accompanying illustration shows the type of sign adopted by the New York Municipal Railway Corporation for use on the platforms of stations on the elevated structure at which both express and local trains stop and where the platforms are therefore placed between the tracks used by the two classes of service.

ILLUMINATED STATION SIGN

The sign itself is of enameled iron with white lettering placed on a dark blue background and supported by an ornamental iron framework. In order that the sign can be read easily at night it is lighted by incandescent lamps placed with their axes in a horizontal plane and with their wiring in conduit, the lamps being concealed in the hood over the sign. These lamps, when an entire circuit of five is not used, are part of one of the circuits providing general illumination for the platform.

The hood is in the shape of an inverted trough, the sides being lined with white enameled steel which acts as a reflector and throws the light from the lamps down.

Letters to the Editors

The Rail Research Problem

PUBLIC SERVICE RAILWAY
NEWARK, N. J., March 8, 1922.

To the Editors:

In the issue of the ELECTRIC RAILWAY JOURNAL for March 4 appears an editorial on the subject of "Applying Some Real Research to the Rail Problem." The importance of this subject with reference to arc-weld joints is sufficient to warrant some further comment, although it is only recently that manufacturers and users of arc-welding equipment have come to a proper realization of the truth of the matter.

Among other things your editorial stated: "Some agency should have been established long ago to try out the various joints and processes on a limited scale on behalf of the whole industry." This suggests an arrangement, however, which, although ideal, will, in my opinion, never be fully realized. While I am a member of the recently formed committee on welded joints, I believe that, although this committee will ultimately accomplish a great deal of good, it is going to be seriously handicapped in its work due to the natural reluctance on the part of some individuals or companies to appropriate any money which would be used either wholly or in part for the investigation of other people's products or practices. They might, however, be willing enough to put up the money if they could be assured that it would all be spent in investigating their own joint problems. But in the operation of such a committee as has just been formed, any money contributed must necessarily go into a general fund to cover all research work, and without this money little that is worth while can be accomplished. Also, because of the size of the committee and the diversity of interests represented, it will necessarily be slow in reaching an agreement and submitting a final report.

The development of joint welding is taking practically the same course as did that of the electric motor twenty-five or thirty years ago. Arc welding has progressed, as your editorial states, only because a few electric railway engineers had the courage of their convictions and did not let failures in the early stages of their experiments discourage them from making further attempts. If some of the companies which did most of the waiting and "heavy looking on" in the earlier days had joined in the experimental work, the rail-joint-welding art would be further advanced than it is.

Manufacturers of arc-welding equipment have recently come to realize that, if they are to continue long in the business, they must obtain a more definite knowledge about what takes place under the action of the arc and how to control this action. An accurate knowledge of this is probably of more vital importance than the manufacture of the machine for producing the arc, if the welding process for rail joints is to endure. In the case of the seam arc weld, experiments would seem to indicate that certain physical characteristics in the resultant metal in the seam are essential if satisfactory results are to be expected. At least one company manufacturing arc-welding equipment is spending considerable money in making elaborate laboratory tests and analyses of welded joints, working in co-operation with electric railway engineers using their product, in an effort at self-education on the subject. The experiments in question have already developed interesting and valuable data which have somewhat upset at least one previously accepted theory as to the effect of the carbon electrode on the carbon content of the resultant metal in the seam. Although represented on the committee on welded joints, the company referred to has for its own protection been obliged to go ahead with its own experimental research work, since it could not afford to sit quietly by and await the results of the work of the committee, which will necessarily be slow.

HOWARD H. GEORGE,
Engineer of Maintenance of Way.

Virtue in the Hole of the Doughnut

PLYMOUTH, MASS., Feb. 23, 1922.

To the Editors:

I am a New Englander from one of the oldest sections and am therefore qualified to speak on the question of doughnuts. I agree with you in your editorial in the issue of Feb. 11, that considering the misnomers applied to the delectable delicatessen which we, in this section of the country, dip in our morning coffee, it is dangerous to use them as subjects for comparison. But a doughnut in New England is in reality just what you use to build upon in your article. Its outline is formed by two concentric circles, one full of air and aroma and the other full of solid satisfaction.

In boom or depression we look at the hole as well as the doughnut, for without the hole the result would be a heavy, soggy doughnut such as one buys full of poor jelly in New York.

In boom times the hole represents the unemployed. In times of depression the doughnut represents wholesome unrest, and unrest means a getting back to normal times again. A doughnut sinks when it is first put in the kettle, but bobs up serenely as it becomes edible, so if the electric railways and manufacturers who sell service and supplies will watch the doughnut as it rises they will have no ground for pessimism.

JOHN RUSSELL, JR.

"Bus Transportation" Renders Valuable Service to Railway Companies

STONE & WEBSTER, INC.
Management Division

BOSTON, MASS., Feb. 25, 1922.

To the Editors:

I have noted with interest the controversy which has been going on over the propriety of your magazine's having inaugurated the publication of BUS TRANSPORTATION. The objections seem to boil down to a feeling that this move on the part of your magazine is disloyal to the electric railway industry. The thought that impresses me most with regard to the publication by you of "BUS TRANSPORTATION" is that it presents the subject from the point of view of the electric railway companies. The other magazines in the interests of bus transportation are published by parties antagonistic to the electric railway, and it seems to me, therefore, a decided boon to the electric railways themselves to have the subject of bus transportation ably presented by a concern which is familiar with their business.

C. W. KELLOGG.

Columbia, Carolina Capital City, Completely Carless

Strike Occurred Over Question of Right to Discharge—Resumption Delayed Because of City Ordinance—Compulsory Arbitration Act Passed by Legislature, but Company Applies for Injunction on Ground of Unconstitutionality—Public Opinion Favorable to Company

MAIN STREET, COLUMBIA, S. C., WITH STATE CAPITOL AT END OF STREET

THE City of Columbia, S. C., has had no electric railway service since Feb. 15. On the evening before the men decided to send the unwelcome valentine to the citizens of Columbia and to the company that they had decided to leave its service, which they did forthwith. Since that time the company has been unable to operate any cars because of an ordinance passed by the city in November, 1917, forbidding the employment of any motorman or conductor within the city unless he had received instruction on the cars in Columbia for the fifteen days immediately preceding the time of assuming his duties, the instruction to have been given by a motorman or conductor who had been actively employed in such capacity in Columbia for the six months immediately preceding. The penalty for the violation of this ordinance is a fine of not less than $50 or more than $100 or imprisonment of not less than ten or more than thirty days for each and every violation. In these circumstances the company had no option but to stop service.

Columbia is the center of a rich agricultural district as well as being the state capital and an important railroad center, the Southern Railroad, the Sea Board Air Line and the Atlantic Coast Line all entering the city. It has a population of about 50,000 and its railway system serves a population of about 10,000 more people. The Columbia Railway, Gas & Electric Company, which operates the railway system within the city, has about 55 miles of track, 53 motor passenger cars and 12 trail cars and is owned largely in Columbia. It has some suburban extensions, the longest being to Camp Jackson, 6 miles away. This extension was built during the war when the camp was used by the government for training recruits for the army. It now has only a small army post. The other main extensions of the railway are that to Ridgewood, 3 miles, and that to Olympia, 2 miles. The fare for some time has been 7 cents with 3 cents for a transfer within the city. All of the extensions are within the single-fare zone except that to Camp Jackson, and on that line there are two zones of 7 cents each. All cars have been operated by two men because of a city ordinance passed a number of years ago declaring: "It shall be unlawful for any electric street car to be run in the streets of Columbia unless the same is in charge of a conductor."

COMPANY EXPLAINS SITUATION TO PUBLIC

Operated under the conditions which existed in 1921 the railway has not been able to pay even operating expenses, and last November the company thought it wise to explain the situation as it existed to the public. In consequence it published the following notice in the daily papers under date of Nov. 12:

COLUMBIA RAILWAY, GAS AND ELECTRIC CO.

F. H. KNOX, *President*

COLUMBIA, S. C.

November 12, 1921

The Street Railway Problem in Columbia

TO THE CITIZENS OF COLUMBIA AND VICINITY:

During the years that the street railway has been operated in Columbia, it has been the aim of those in charge to give good service and to keep the service in advance of the growth of the community. Every citizen of Columbia is interested, directly or indirectly, in having adequate and efficient street car transportation in Columbia and vicinity. Many people have no other means of transportation. The suspension of street car service would hurt nearly every business interest in the city, and some kinds of business seriously.

We are submitting the following statement of earnings and expenses in the street railway department for the first ten months of 1921:

Earnings street railway, all sources, ten months in 1921	$375,761.97
Operating expenses, including taxes	467,716.43
Deficit	$91,954.46

The above statement shows that the earnings of the street railway for the first ten months of this year are not enough by $91,954.46 to pay the bare operating expenses and taxes. In other words the company is sustaining a direct loss of more than $9,000 per month, besides the actual loss to the

investors in the property, by reason of the failure of the street railway department to earn any money with which to pay the interest on the large amount of capital invested in this department. Every effort has been made to reduce operating expenses and to operate the system as economically as possible, but we are still confronted with this large deficit. We have about reached the point where we cannot continue indefinitely the operation of the street railway system at such an actual loss.

Two ways naturally suggest themselves, by which the situation might be remedied to some extent. The first is, by raising the present rates of fare and, thereby, to increase the earnings. The company is of the opinion, however, that the present fare is as high as it should be, both for the interest of the company and for the interest of the people. It believes that the people should not be called upon to pay a higher fare, and it believes, further, that a higher fare would not bring in any more money to the company. The second remedy is to reduce operating expenses by reducing the wages of employees and, also, by reducing service. We believe that it will be necessary to make some reduction in the wages of our employees, but we think that this should not be a drastic reduction at this time, in fairness to them. We are also considering the reduction of service, and can effect some economy in this way, but we believe that the saving that might be effected by either one of these methods will not substantially reduce operating expenses. In other words, after we do all that can be done along these lines we believe that there will still be a very large deficit in receipts as compared with operating expenses, and so large that the company cannot stand these losses much longer.

The company desires to state to all parties interested that this problem has become acute. Whether or not some plan can be devised whereby it can be made possible to continue to operate a street car system in Columbia is fully as important a question to the people of Columbia as it is to any stockholder in the company—perhaps more important. We have always felt that we had the confidence of the substantial business people of the community, and it is their interest and the interest of the people who use the cars, as well as our own, which we seek to protect, and it is their advice and counsel we ask in helping us to solve this serious and perplexing problem.

Respectfully submitted,
COLUMBIA RAILWAY, GAS & ELECTRIC COMPANY.

Citizens Asked to Give Matter Thought

In commenting on the situation at that time F. H. Knox, president of the company, said, in part:

"The Columbia street car system is facing a crisis, a crisis which is causing the men connected with it deep concern. Our problems are the problems of the city of Columbia, and we are, in all sincerity, asking the citizens of Columbia for advice and for counsel in devising a plan whereby we can continue to operate the street cars.

"It is needless for me to stress the importance to a growing city of an adequate street car system. All persons who have given the matter any consideration know what a good street car system means in the growth and prosperity of a city, and we are as anxious to maintain a good system as are any of the people of this community. But a deficit of approximately $91,000 in ten months operation is no light matter. How can we continue to operate the street cars under such conditions is the question before us, and it is a question that is of interest and importance to hundreds of citizens."

In speaking of the advertisements Mr. Knox said: "The company has no ulterior motive—we are facing a serious situation, and this situation may affect hundreds of citizens who depend on the street cars for transportation from place to place.

"We doubt the wisdom of increasing fares to 10 cents, and are not sure that such a step would increase our revenues. To replace our two-man cars with the 'one-man' or 'safety' car would involve a heavy expenditure and at that might not relieve the situation.

"To reduce the wages of our employees might bring some relief, but the company hopes to be able to avoid any drastic reductions. It is seen at once that the problem is not one easy of solution, and we hope the thinking people of Columbia will give the matter due consideration."

Slight Reduction Made in Wages

During 1921 the company had an agreement as to wages and working conditions with its employees who are members of local division 590 of the Amalgamated Association. This contract expired on Dec. 31, 1921, and in its renewal the company sought some relief from the high-rate war wages which it had been paying and also better conditions as to assignment of runs and discipline, particularly in regard to the right to suspend or discharge any men when such action seemed to its officers necessary. In consequence it submitted the following agreement to the men as the best that it could make for 1922 and at the same time continue the operation of cars.

Proposed Agreement

"*Memorandum of Agreement* made this first day of January, 1922, between the Columbia Railway, Gas and Electric Company, hereinafter called the Company, and Local Division Number 590.

Section 1—The company agrees that the following rules and regulations shall be applicable to all motormen and conductors.

Section 2—The company will not discriminate for or against any employee by reason of his affiliation or non-affiliation with any labor organization; nor will it attempt to coerce or influence any employee against or in favor of becoming a member of such organization.

Section 3—The runs shall be arranged so that they will be as nearly nine hours long as practicable. In the assignment of runs, the company reserves the right to place men on such runs as in its judgment they are best fitted for.

Section 4—The company reserves the right to suspend and to discharge any motorman or conductor whenever in its judgment such action may be necessary.

Section 5—The wage scale on and after Jan. 1, 1922, until Jan. 1, 1923, shall be as follows: First three months, 41 cents per hour; second three months, 44½ cents per hour; six months and over, 48 cents per hour.

Section 6—This agreement to be in full force and effect Jan. 1, 1922, to Jan. 1, 1923; provided, that if the company shall cease to operate the street railway this agreement shall be at an end."

This contract proposed a reduction of approximately 10 per cent in the wages of the men but made substantial changes in certain other features of the previous contract.

Discharges and Seniority the Issue

In reply under date of Dec. 24 the employees accepted the wage scale as well as Section 2 and insisted on "the right of seniority and arbitration" and suggested that this matter be left to arbitration. To this the company replied by letter as follows:

We note that you accept the wage-scale specified in the agreement submitted to you. We note, further, that you accept Section 2 in the agreement, in which the company recognizes the right of any employee to affiliate with any labor organization, or not to affiliate as he may think proper. The agreement also provides that the runs shall be as nearly nine hours long as practicable, this being the length of runs now in effect.

In any agreement between an operating company and its employees the essential provisions, which admit to exact definition, are the wage scale and the hours of work. It is the policy of this company to give every man a square deal and, wherever we can, to reward faithful and long service. Just what is a square deal cannot be defined in any agreement, as it is a very broad term. It touches every association and should be the controlling rule of all the men working for the company, whatever their position or work may be, in their relations one with another. We can say this, however, to every man working for the company who is honest, conscientious and efficient to the best of his ability in the performance of his duties, that he need have no fear of losing his job as long as the company can find any employment for him. The agreement submitted to you contains the best and fairest terms we have to offer.

We note, further, in your letter that you say you must insist on the right of seniority and arbitration. The street railway situation in Columbia has reached a critical stage, so critical that we may find it necessary to discontinue operations. In view of the seriousness of the situation we

cannot agree to submit to arbitration the question of whom we shall employ or discharge, or the work to which we shall assign our employees. In other words, if we are to continue operations we insist upon directing the affairs of the street railway to the best advantage. You may consider the position of this company final on these points.

During January and the first part of February, 1922, there was no change in the financial condition of the company. The figures for the year 1921 showed that the street railway department failed by $119,758 to earn operating expenses and taxes, and during January, 1922, the deficit on the same basis amounted to $11,886.

Finally, on Feb. 14, the company dispensed with the services of twenty-one conductors for adequate cause. This left 108 conductors and motormen in the service of the company. These men immediately struck. The company promptly published the facts in the daily papers in regard to the dispute, including the correspondence between the company and the union.

Compulsory Arbitration Ordered

The issue was thus clearly drawn, *i.e.*, the right of the company to discharge men and assign runs. These points it considered it could not arbitrate in the interests of discipline and it declined to enter into any arbitration on these points.

While the cars were standing still, a bill was introduced and passed by the state legislature requiring compulsory arbitration between street railways in the state and their employees at the request of either party. This bill, whose application was limited to street railways in cities with a population of between 30,000 and 50,000, and thus covered Columbia only, declared that the board of arbitration for such disputes should consist of a representative from each side and a third to be chosen by them. If they could not agree the mayor of the city in which the railway company is located is to act as the third arbitrator, and if either party after five days notice fails to appoint its representative he shall be named by the judge of the court of common pleas resident in the circuit. The decision of this board according to the act is declared to be final except on questions of law and on these appeal may be had to the state courts. This bill was ratified by the governor on Feb. 24.

To those to whom the passage of such an act by a state legislature may appear surprising it might be said that as recently as March 10, 1922, the Senate of South Carolina voted to attach a proviso to the act appropriating funds for the public school system, withholding financial support from all institutions of learning supported by the State "teaching, or permitting to be taught, as a creed to be followed, the cult known as Darwinism." Such institutions are permitted to explain what this cult is, just as they may tell the students about the legends in ancient Greek mythology, but they are not to teach the principle of natural selection and the survival of the fittest as a law of nature.

Another act of the South Carolina legislature, passed in 1915 and still on the statute books, forbids employees of "hotels, restaurants, cafés, railroad companies, sleeping car companies and barber shops" from receiving "gratuities or tips." This act, according to law, is posted in all hotels, restaurants, railroad stations and barber shops, and all persons are warned not only against the receiving but the giving of tips.

Following the passage of the arbitration act and its approval by the governor on Feb. 24, the Columbia Railway, Gas & Electric Company lost no time in applying for an injunction in the South Carolina State Supreme Court to restrain any action taken under the compulsory arbitration act on the ground that it is unconstitutional. Briefly, the reasons for this contention were that the statute was discriminatory, first because it applied to only one of five electric railway companies in the state and second because it differentiated electric railway companies from other corporations. The company's plea also declared that the act violated the free-

To Our Street Car Patrons

The company is greatly concerned over the possibility that any of its patrons should think that it is unreasonable in its position with reference to the strike.

The company is willing and anxious to resume service as soon as it can do so under circumstances and conditions that offer any possibility of successful permanent operation.

It is impossible for us to operate the street cars unless we can have the right to select our motormen and conductors, the right to specify their work and the right to discharge them without arbitration. Any effort to operate under a contract, taking these rights away from us, will necessarily result in failure within a very short time. The company feels that in standing out for these rights it is not only seeking to promote its own interests, but is also seeking to promote the interests of its patrons and the public, because any effort to operate otherwise is certain to result in failure and very probably cause the permanent abandonment of the street car system in a very short time.

The company is advised by its attorney that the arbitration act is unconstitutional and proposes to immediately test it in the courts. If the company arbitrates under that act it runs the risk of having an award imposed upon it under which it can not possibly operate successfully.

We sincerely believe that in standing out for what we consider to be our rights and for what is necessary to the successful, permanent operation of the street cars here, we are doing the right thing for ourselves and for those using the street cars.

An ordinance, adopted by city council in 1917, forbids under heavy penalty any person from acting as motorman or conductor who has not had fifteen days' instruction in this city by another motorman or conductor of six months' experience. This ordinance makes it impossible for us to secure any motormen or conductors.

Respectfully submitted,

Columbia Railway, Gas & Electric Co.

By F. H. Knox, President.

February 27, 1922.

To the Motormen and Conductors Formerly in the Employ of the Columbia Railway, Gas & Electric Company

The Columbia Railway, Gas & Electric Company is anxious to resume operation of its street cars. It will reinstate the motormen and conductors leaving its service on February 15, at the same rate of pay that they were drawing on that date, and with their seniority rights as of that date, in so far as it is possible for the Company to recognize them.

The Company will make no discrimination between union and non-union men, and there will be no discrimination against any former employee because he left the service on February 15.

The rate of pay for this year is as follows:

First 3 months, 41c per hour.
Next 3 months, 44½c per hour.
Six months and over, 48c per hour.

As stated above, former employees will be reinstated at the rate of pay they were drawing on February 15.

The Company reserves the right to discharge employees.

Columbia Railway,
Gas & Electric Company
By F. H. Knox, President.

March 2, 1922.

TWO ADVERTISEMENTS IN WHICH THE COMPANY EXPLAINS ITS POSITION

dom of contract in that it allows a third person to fix the terms of an employment contract. A decision of the court on this plea for injunction is expected within a very few days.

RAILROAD COMMISSION WILL ACT

During the present session also the legislature has increased the Board of Railroad Commissioners from three to seven members. Previously these members have been elected directly by the voters. The last named members were elected by the legislature. The attorney-general is said to have given the opinion that the newly constituted commission has authority to regulate the service of the street railway company, but nothing has yet been done by the commission as it has only just been organized.

THE PUBLIC TRAVELS BY AUTO

As a substitute for trolley service since Feb. 15, the public has been forced to walking and riding in automobiles. The number of autos in and around Columbia is very large, the streets are wide and the pavements are fairly good. Moreover, the main business street of the city, called Main Street, is a very wide thoroughfare with ample accommodation for parking. A view of Main Street with the State Capitol in the distance is given at the heading of this article. Not a large number of jitneys have put in an appearance, but owners of autos have been very liberal in "giving a lift" to their friends and even to strangers. In addition, some of the large employers of labor, like the cotton factories, carry their employees in standing loads between the center of town and their places of work on trucks.

There has been one attempt to conduct a mass indignation meeting against the company, but the general sentiment about this and the action of the legislature can be gaged by the following, which is part of an editorial in the Columbia *Record* of March 10:

> We have entered on the fourth week of the street car strike in Columbia. The prospect of a settlement of it seems to be as remote as ever it was. What are we going to do about it?
>
> The mass meeting at the court house on Monday night was manifestly "staged." A casual inspection of the names of the speakers, and a little knowledge with regard to their relations to our general business situation and to politics, is all that is necessary to enable an observer to reach this conclusion. The meeting was nothing more than a gesture. The foregathering of union leaders, union men, politicians in office, politicians seeking for office, and attorneys affiliated to the carmen's union and to former litigation against the company, is not convincing as a manifestation of public indignation against the company.
>
> The effort to create public opinion in favor of the carmen who struck without notice because the company discharged some members of the union does not strike us as an intelligent effort to settle the strike in the present and ultimate interest of Columbia and its public utilities.
>
> Other gestures have emanated from the politicians in the General Assembly. They are equally futile, as we view the situation. The public utilities in Columbia have long been the football of small politicians and small candidates for public office. The issues involved cannot be settled by such as these, who fatten on prejudice and truckle wherever a vote is in prospect.
>
> But there must be a settlement of the problem, somehow and sometime soon. It occurs to us that the matter is of sufficient consequence for the really and vitally interested business men of the city, who have a stake in the community and work for a living, instead of eternally "politicking," to seriously investigate, impartially, with an eye to the future, and in calmness of judgment, in order to ascertain if something can be done. We believe that most people are growing weary of political gestures.

Executive Board of Federated Engineering Societies Meets in Chicago

WITH President M. E. Cooley, dean of the colleges of engineering and architecture, University of Michigan, presiding, the executive board of the American Engineering Council, Federated American Engineering Societies, met in Chicago on March 10. The board spent the day in giving consideration to a host of subjects which came up for attention, and was entertained in the evening by the University of Michigan Engineers' Club of Chicago with President Marion LeRay Burton of the university and Dean Cooley as the principal speakers. Dean Cooley gave expression to some of the ideals and purposes of the Federated Societies. He spoke of how little the engineer is known in the mind of the general public and said that the ambition of the Federated Societies movement is to put the engineer up in his proper place in public esteem and give him the opportunity to play the part in public affairs for which he is needed. He pointed out that the present organization comprises twenty-eight societies with a membership of approximately 50,000 and that when all societies which are entitled to membership have taken it, there is a prospective membership of from 175,000 to 250,000 engineers. When the engineers are brought into their own in public affairs through this organization, the dean predicted that legislation would be handled on a broader basis with less evidence of selfish interests and compromise.

Speaking of the accomplishments of the Federated Societies, Dean Cooley mentioned the investigation to eliminate industrial waste as the greatest. Another important thing was the work done in bringing about the passage of the bill by Congress which will authorize a reorganization of the U. S. Patent Office. Perhaps of greatest interest was his statement of the kind of things which the Federated Societies can undertake. Among these was a study of the transportation systems. He pointed out that the present average mileage of a freight car is 24 miles in a day. If a study should bring out how it might be possible to increase this even to 50 miles per day, he said that the saving in equipment and in train crews alone, would be enough to pay a return on the entire railroad investment. It was his opinion that the engineers should make such a study, for it is the engineer who has built the railroads, who is operating them, and who knows what the costs are, and yet he has taken no part in the great transportation problems as they have been before the public.

Dean Cooley expressed the thought that the public does not want the opinion of individual engineers in such great matters of public concern; what it does want is the opinion of the engineering profession. The public, the utilities commissions and the courts refuse to take the word of anyone, and this merely points again to the great need for the expression of profession-wide advice which may be accepted as being free from selfish interest and inspired only by the desire to serve the best interests of all.

Other things mentioned as the kind that can be undertaken by the Federated Societies, by the dean, were foreign trade development and what to do about the forests and reforestation.

ACTION TAKEN BY EXECUTIVE BOARD

In its meeting during the day the executive board of the Council discussed in some detail the aspect of the proposal to form a world-wide engineering organization and a committee was authorized to consider the various phases of the whole question including such constitutional changes as would be necessary. The Sterling bill for reclassification of engineers was indorsed rather than the Lehlbach bill, since the salary schedules of the former were

approximately 10 per cent higher than in the latter and conform more nearly with the report of the original reclassification committee.

The subject of employment service, which the committee on that subject believed should be turned back to the jurisdiction of the constituent societies, was permitted to remain in status quo and a new committee was authorized to bring in a new report. The proposal that the societies should publish a bulletin was laid on the table and later revived and a committee asked to bring in information on proposals made to handle a bulletin by a private publisher. Other subjects laid on the table were the proposals to take a part in the Muscle Shoals project, the utilitarian use of national parks, tariffs on technical books, the Great Lakes-St. Lawrence Waterway, and the International Engineering Congress in Rio de Janeiro. The recommendations of the conference on paving brick standardization were approved.

Canadian Association Will Convene at Quebec

PREPARATIONS are in full swing for the annual convention of the Canadian Electric Railway Association, which will be held at Quebec, June 1 to 3. In connection with the meeting there will be an exhibit of electric railway supplies. The Drill Hall, a five-minute walk from the Chateau Frontenac, will be used for the meeting and exhibit. The hall provides space for from twenty-five to thirty exhibits.

On March 14, R. M. Reade, superintendent city division Quebec Railway, Light & Power Company, chairman of the committee on exhibits, sent to all associate members the details of the exhibit plans. He sent a chart of the Drill Hall, showing the spaces available and the allotments to all associate members. The space is donated, and Mr. Reade's committee will do everything in its power to facilitate the preparation of exhibits. Power will be supplied to exhibitors desiring to have an operating exhibit.

Annual Banquet of New England Club

THE twenty-second annual banquet of the New England Street Railway Club will be the occasion of several notable addresses. The speakers will be Hon. Channing H. Cox, Governor of Massachusetts; Hon. James M. Curley, Mayor of Boston; Hon. William D. Riter, Assistant United States Attorney-General, and Gen. Guy H. Tripp, chairman of the board of directors, Westinghouse Electric & Manufacturing Company. The toastmaster will be Hon. Samuel L. Powers.

The banquet will be held at the Copley Plaza Hotel on Thursday, March 23, at 6:30 p.m., preceded by a reception at 6 o'clock. On Thursday afternoon at 3 o'clock the annual meeting for the election of officers will be held.

Government and Industry Co-operate in Standardization

AT THE request of Hon. Herbert C. Hoover, Secretary of Commerce, the American Engineering Standards Committee has designated A. A. Stevenson, the retiring chairman of the committee as a special representative to work with the department in the operation between the department's Division of Simplified Practice and the American Engineering Standards Committee.

The Division of Simplified Practice is a co-ordinating unit of the Department of Commerce assisting in those reductions of excessive variety and other simplifications which many industries are undertaking in order to decrease the cost of production and distribution of manufactured articles. The work of the division was organized in the latter part of 1921 and is now actively under way.

Mr. Stevenson, who is a past-president of the American Society for Testing Materials, is vice-president in charge of manufacture of the Standard Steel Works Company, a subsidiary of the Baldwin Locomotive Works.

American Standards "In Process"

A report just issued by the American Engineering Standards Committee states that on Dec. 31, 1921, seventeen standards were definitely before the committee for approval. Those of particular interest to electric railway men were the following:

Standards of American Institute of Electrical Engineers, National Electrical Safety Code, specifications for carbon-steel and alloy-steel forgings; and quenched and tempered carbon-steel and alloy-steel axles, etc., safety code for the use, care and protection of abrasive wheels. Since the report was prepared the abrasive wheel code has been approved as explained below.

Safety Code for Abrasive Wheels

THE American Engineering Standards Committee has approved as "Tentative American Standard" a safety code for abrasive wheels. This was prepared under the joint sponsorship of the Grinding Wheel Manufacturers Association of the United States and Canada and the International Association of Industrial Accident Boards and Commissions. The code contains rules and specifications for the operation of wheels operating at speeds in excess of 2,000 surface feet per minute. Copies may be secured at a nominal price from the committee, 29 West Thirty-ninth Street, New York, N. Y.

American Association News

Bus Operation Discussed from Transportation Angle

A MEETING of the T. & T. Association committee on trackless transportation, which is co-operating with the American Association committee on the same subject, was held in Baltimore, Md., on March 15. Viewing the subject from the transportation angle the committee held that the bus could function economically under certain conditions. To establish the limiting conditions the committee plans to submit as a part of its report a comprehensive analysis showing under what traffic conditions and operating costs the motor bus, the trolley bus and rail operation can function to the best advantage, each as a co-ordinated part of a complete urban or interurban transportation system.

The committee also undertook to skeletonize its report for the purpose of analysis and to bring out constructive discussion for its next meeting, scheduled to be held on March 30 in Baltimore.

Those present at the meeting were C. D. Porter, Newport News, chairman; J. L. Adams, Philadelphia & Western Traction Company; W. E. Martin and L. H. Palmer, Baltimore; and H. B. Flowers, Baltimore, chairman of the American Association trackless transportation committee.

Association Bulletins for February

THE following reports were prepared by the bureau of information and service during February:

State Regulation of Motor Vehicles, containing copies of all state legislation affecting the operation of motor vehicles as common carriers.

A Compilation of Cities in which Fares Were Changed. This information is as of March 1, 1922, and shows the city, population, operating company, cash fare, ticket rates, etc.

Employees' Welfare Plans. This is a report made to the New York Transit Commission covering benefit systems, social and recreational activities, individual and group rewards, profit sharing and employee representation in the management of electric railways.

Pole Statistics, showing, for a group of the larger companies the number and types of poles in use and the annual renewals and additions from 1917 to 1921.

Maintenance Costs of Company Automobiles and Line Trucks. Gives detailed figures for month of October and the ten months ending Oct. 31, 1921, of two electric railways.

Working Conditions of Trainmen. This is a supplement to last month's compilation of the same name and gives data for fifty additional companies.

News of the Electric Railways

FINANCIAL AND CORPORATE :: TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

People Will Decide

Stockholders of the D. U. R. Unanimously Vote for Sale of Property to City—Final Step Reached Before Election

At the stockholders' meeting of the Detroit United Railway on March 11 the contract entered into by the company's directors providing for the sale of the Detroit city system to the city was ratified by a unanimous vote. This act paves the way for a vote on unified municipal ownership of street railways in Detroit and a special election will be formally called for April 17 to vote on the purchase plan.

THE company agreed to sell for $19,850,000, its entire system including lines, cars, carhouses and real estate located in Detroit, Highland Park and Hamtramck, with the exception of about 15 acres of its 46-acre property in Highland Park, 12 acres at Mackinaw Avenue, on Grand River Avenue and the Interurban building at Jefferson Avenue and Bates Street, Detroit.

Bond Issue Will Be Put Before People

At the special election the voters will also be asked to vote a bond issue of $4,000,000, out of which the company is to receive a down payment of $2,770,000. The balance of the bond issue will go to meet expenses incidental to taking over the lines, as an operating fund, and for the purchase of material now on hand from the company. The increase in the bond issue over what was originally thought necessary was deemed essential by the street railway commission to allow the entire system to start efficient operation. If the purchase plan is approved by 60 per cent of the voters the lines will be taken over on or about May 17.

In addition to the down payment, the agreement provides that the city shall pay $500,000 semi-annually until Dec. 1, 1932, when the balance is to be paid in a final payment. Interest at the rate of 6 per cent per year is provided for on all deferred payments.

If the people vote for the purchase of the company's lines the thirty-year war between the city and the company will be ended. Along with approximately 300 miles of track the city will acquire 592 double-truck cars, 196 large trailers and 369 smaller cars.

Mayor Couzens expressed his satisfaction with the proposed terms of sale, believing that the lines can be made to pay their own way, meeting the semi-annual payments and paying all interest on indebtedness. Eventually, he believes, the lines will show a surplus and the sinking fund and interest charges on the $15,000,000 bond issue voted in 1920 for the construction of a municipal system will be met.

The property which the company is willing to sell for $19,850,000 does not include all that was included in the $31,500,000 purchase plan that was voted down in 1919. Since that time the city has acquired approximately 30 miles of the company's tracks and 128 cars taken over at a price of approximately $2,400,000. The cars have been in use since they were acquired in maintaining joint operation over company lines. The following outstanding features are embodied in the agreement.

The city of Detroit, subject to a three-fifths vote of the electors, agrees to buy from the company all the street railways, street railway property (including franchises and other rights) and real estate, together with all overhead and underground wires and appurtenances except panels and feeders for the company's interurban system. It is to pay in cash on or about May 15, 1922, $2,770,000 and $9,500,000 in nineteen semi-annual installments of $500,000 each on the first day of December and June, commencing Dec. 1, 1922, and including Dec. 1, 1931. On Dec. 31, 1931, the balance of $7,580,000 is to be paid in cash. Interest is to be paid quarterly on unpaid portions at 6 per cent per annum. The city reserves the right to increase the semi-annual payments, provided it gives the company thirty days' notice.

The property is to be maintained in good repair at all times until the purchase price is fully paid. The city may abandon or remove certain trackage specified which, by reason of shifting population and the like, becomes useless and unprofitable. The company is to maintain all property in the present state of efficiency and repair until the date of actual delivery to the city of possession of the property to be conveyed. Interurban or suburban service of the company is to be allowed to continue substantially as at present. Passenger cars to use the present interurban station as a starting point. The existing freight terminals are to be continued. Interurban cars are to be operated by the company's own crews subject to city control and regulation.

Steps in Event of Default Explained

The company's permit to use the city lines for its interurban cars may at the option of the Board of Street Railway Commission be suspended or terminated whenever the company is in default of any of the terms of the agreement, if default continues for sixty days after written notice of intention to declare the permit suspended. The city is to have the right to terminate the permit to operate the interurban cars over lines within the corporate limits at the end of any calendar year after two years notice of such intention. Such notice shall consist of a resolution adopted by the Board of Street Railway Commission confirmed by the Common Council.

The city does not agree to become personally liable to pay the balance of the purchase price or the interest thereon. To enforce the payment the company may resort to the courts. No part of any extension or addition to the railway system made by the city is to be subject to the lien of any mortgage made by the company.

Of the initial payment, $2,500,000 and the fifteenth semi-annual payments of $500,000 each are to be deposited in escrow with a trust company, all expenses chargeable to the company. This money so deposited is to be used by the company to purchase or pay outstanding obligations of the company.

In event of default of payment of any installment or interest on the unpaid price or part thereof, the company may apply to a court of equity to obtain a specific performance of the contract, which court may establish and compel the collection of such rate of fare as will provide adequate funds to meet defaulted obligations, and may appoint a receiver of the property, securing the unpaid balance of the contract and grant any further appropriate relief. Or the court may through any lawful agency take possession of the property and operate it at an adequate rate to meet defaulted obligations.

In event of default in payment of the final balance of $7,580,000, the company may foreclose the contract by lawful method and have the right of the appointment of a receiver.

When the property is delivered to the city, the company is simultaneously to deliver any books, records, documents, literature and data needful for use in the management and operation of the property.

All pending suits and actions and alleged causes of action between the parties are to be settled, released and discharged upon the execution of the agreement, and the city is to withdraw all pending complaints and suits for violation of ordinances.

Since the purchase price is less than the amount of existing mortgage liens, the company warrants and defends the city from any action that might result from the excess liability, and this undertaking is to be a lien against the remaining Detroit United Railway assets. The property is to be freed by the company of all debts or obligations and no additional mortgages or liens are to be issued by the company.

The right is given the city to sell separate parts of the property whenever such parts become useless for street railway purposes.

Pending approval by a requisite vote of the electors of Detroit, and the transfer of possession, neither party acquires nor waives any right it may have, if any, to operate cars over the streets of the city. In event of the rejection by the electors, the rights of both parties will remain in all respects as if the agreement had not been entered into.

At the meeting of stockholders and directors, Elliott G. Stevenson, former chief counsel for the Detroit United Railway, was elected acting president and member of the board of directors as well as chairman of the executive committee of the company, replacing Allen F. Edwards.

The office of president will be left vacant until the outcome of the purchase plan is known. Judge Charles Laurandeau, Montreal stockholder, was elected first vice-president and E. J. Burdick, former general manager, was also made a vice-president. A. Avila Gingras was made treasurer, and Joseph Bampton assistant treasurer. J. E. Gill, J. O. Desmarais and M. A. Boivin of Montreal were replaced on the board of directors by E. J. Decary of Montreal, Mr. Stevenson and Mr. Burdick.

Four Cents an Hour Reduction in Reading

A new wage scale affecting employees of the Reading Transit & Light Company, Reading, Pa., went into force on March 1. The new schedule effects a reduction of 4 cents an hour. The new rates in cents per hour are as follows:

First six months	41
Second six months	42
Third six months	43
Fourth six months	44
Fifth six months	45
Thereafter	46

Court's Aid Sought

Pacific Electric Railway Petitions Court to Make Strike Injunction Order of 1918 Permanent

In the United States District Court at Los Angeles the Pacific Electric Railway on Feb. 28 petitioned to make permanent the temporary restraining order issued by U. S. District Judge Bledsoe on July 2, 1918, against the company's trainmen, who went out on a strike during July, 1918, while the United States was at war.

The action is the Pacific Electric Railway against M. E. Montgomery and J. A. Farquason, organizers of the Brotherhood of Locomotive Engineers and Brotherhood of Railroad Trainmen with headquarters in Cleveland, Ohio; O. T. Lafever, James Smith, George Duncan, C. N. Herb, A. N. Miller, W. J. Clark et al. Montgomery and Farquarson came to Los Angeles in July, 1918, according to reports, and tried to organize and unionize the employees of the Pacific Electric. It was at the peak of the war with Germany and thousands of men were daily passing over the company's lines between the shipbuilding plants at Long Beach and San Pedro Harbors, also from the rendezvous of troops at the Arcadia Balloon Training Camp and Ft. MacArthur. The temporary order of the U. S. Judge broke the contemplated strike. The union officials demanded that the employees quit the service unless the unions were recognized, but this was not done.

It has been deemed best by the Pacific Electric Railway that the temporary restraining order be made permanent, so as to avoid any recurrence of the industrial crisis which threatened in 1918. The temporary order restrained the defendants from interfering with the employees of the Pacific Electric Lines; from unionizing the employees; from interfering with the trains or trespassing on the property of the company.

The hearing of the company's petition in the United States District Court was held before Judge Frank M. Rudkin of Spokane, Wash. The temporary restraining order of July 2, 1918, as issued by Judge Bledsoe was confirmed by the U. S. Circuit Court of Appeal.

The first day of the hearing brought an effort to make it appear that the strikers who had engaged in the July, 1918, strike had no connection with officers that managed the strike on the company's lines in August, 1919, and that they had been quiescent since Judge Bledsoe issued the temporary injunction in 1918. On the other hand, there was a strong line of testimony showing that the defendants and members of the unions had maintained hostility to the railway and were only awaiting the opportunity that would be afforded by the refusal of the court to make the restraining order permanent to start another attempt to unionize the employees of the line.

Judge Rudkin informed the defendants that if the officers of the lodge proposed to shield themselves behind the cloak of secrecy obtaining in an organization of that sort that the presumption would be against them. This brought the attorneys of the defendants to their feet as one of their witnesses, F. R. Fish of the Brotherhood of Locomotive Engineers, had signed a circular dated Feb. 12, 1922, that asked for a postal-card vote on the question as to the payment of strike benefits growing out of the strike of July, 1918—this to show that the present officials of the unions were still behind the strike of 1918.

In presenting the grounds upon which the plaintiff corporation asked that the temporary injunction be made permanent, railway counsel said that among the members of the Railroad Trainmen and the Brotherhood of Locomotive Engineers the strike of July 2, 1918, was still regarded as "on." John Chriss, a motorman, gave testimony of the efforts to organize the employees in 1918, and said he had been told by A. N. Miller, a union organizer, that it was the intention to unionize the Pacific Electric, and that there would be $15,000,000 of the funds of organized labor to make the drive a success. If he did not join he would be blacklisted.

Attorneys for the defendants claimed that the preliminary restraining order was a war measure and that the ban ought to be lifted so that the men might organize if they now desired to do so. He would not admit that they intended to do so, but asserted that there was no law in the land against men organizing for a lawful purpose. "Dissolve this temporary order," he said, "and if the men disobey the law in any way, bring a new action."

The strike is still on, railway counsel stated, and if the pending injunction is dissolved, the work of unionizing the Pacific Electric Railway will be resumed. Defendant's attorneys in addressing the court asserted that the strike was favored only by the employees of the railway, and not by Messrs. Montgomery, Farquarson and others.

The hearing lasted four days. Judge Rudkin then took the matter under advisement. It will take about two weeks to render a decision. The railway counsel in his final plea to the court asked that the power of the court be imposed against outside interference, and that the defendants be compelled to cease trying to unionize the lines.

What is known as the Hitchins Coal & Coke Company case, in which a sweeping injunction by the United States Supreme Court was issued restraining union-labor organizers from operating among the men employed in West Virginia mines has been largely relied upon by the plaintiff corporation, in the pending proceedings.

Counsel for the defendants argued that the temporary restraining order was a war-time act and that unusual conditions were in evidence, that did not now obtain.

New York Fare Bill Amended

The bill recommended by the New York Transit Commission defining its authority to change rates of fare on New York City traction lines has been amended in both Houses.

The mandatory fare provision is changed so as to except common carriers other than street railroads not included or proposed by the commission to be included in the general plan of readjustment. This change, it is explained, is to avoid any conflict with the general powers of the commission in fixing rates for steam railways between points within city limits.

Another change clarifies the provision that on termination of the lease between the Interborough Rapid Transit Company and the Manhattan Elevated Railway for the operation of the lines of the latter, the commission may require that joint operation be continued for one fare.

There is taken out of the law the clause fixing definitely the salaries of the commission's counsel and secretary so that they may be fixed in the commission's discretion.

At the insistent demand of Corporation Counsel O'Brien, the public service committee of the Senate has agreed to send the measure, now on third reading, back to the committee for a hearing.

Chicago Subway Plan Not Yet a Reality

Chicago is again indulging in dreams about subways which may or may not materialize. Newspapers in that city rceently published a plan for a comprehensive rapid transit system which is said to have been agreed upon by the committee of engineers recently appointed by the local transportation committee of the City Council, although no official report has been made by that body. The plan is said to contemplate 56 miles of tubes providing for 131 miles of single track with a view to carrying over 1,000,000,000 passengers a year. The city has not been able to interest the surface or elevated companies in its project and if the subway is to be constructed as an independent system the only fund available is about $30,000,000, which it is realized would not go far to carry out the plan.

Franchise Draft Rejected

The City Council of Spokane, Wash., recently rejected the proposed franchise submitted by representatives of the Washington Water Power Company and the Spokane & Eastern Railway & Power Company. The franchise provided for a merger of the local traction systems with service-at-cost upon a 7-cent fare basis. The franchise also provided for the elimination of jitneys.

The Corporation Counsel was ordered to draft a new franchise providing for a 6-cent fare without service-at-cost and with no provision for the elimination of buses.

Supreme Court Denies Review of Decision

The Supreme Court of the United States recently denied the application of the Puget Sound Power & Light Company of Seattle, Wash., for review of a decision rendered against it by the U. S. District Court for Western Washington, in proceedings brought against S. B. Asia, Daniel W. Bass and others. The power and light company, as the owner of $15,000,000 Municipal Street Railway bonds of Seattle, sought to set aside a decision obtained by Asia and his associates in a suit brought by them against the city to restrain, among other things, the application of the gross revenues of the municipal railway system to the payment of principal and interest on the bonds in preference to charges for maintenance and operations. Brief mention of the decision in this case was made in the ELECTRIC RAILWAY JOURNAL for March 11.

Counsel for the "fourteen taxpayers" expressed gratification at the Supreme Court's decision, pointing out that the high court in sustaining District Judge Jeremiah Neterer has kept the way clear for the taxpayers' litigation in the state court, seeking to protect the tax fund of the city of Seattle from encroachment by the municipal railway. The taxpayers' action against the city in the state court is now before the State Supreme Court on an appeal from a decision of Judge J. T. Ronald.

Another phase of the litigation over the municipal railway, the suit of the Puget Sound Power & Light Company to compel "specific performance" by the city of the terms of the contract by which the city bought the company's lines for $15,000,000, will be taken befor the U. S. Circuit Court of Appeals by the city of Seattle, which lost in the decision of Judge E. E. Cushman in the U. S. District Court there recently.

Commission Announces Stand on Recent Court Rulings

Little change, if any, will be made in the work and jurisdiction of the California State Railroad Commission by the recent decisions of the Supreme Court in the Wisconsin and New York cases in relation to state rates under the federal transportation act. This is the view of the members of the commission. No new principle, it is said, was announced in the cases, the principle that state rates influencing interstate rates come within the jurisdiction of the Interstate Commerce Commission having been established in previous cases. The later decisions merely confirm the earlier doctrine. The commissioners add that even if the state railroad board had nothing to do with railroad rates, it still would have much work before it in keeping the roads in condition to serve the public properly.

The views of the commission were contained in a statement by Commissioner H. D. Loveland, who stressed the fact that the people of California should realize that the regulation of railroad rates constitutes a rather small share of the commission's work. He said that the name "railroad commission" was a misnomer dating back to the time when the regulation of railroad rates was the commission's only function. He said that since the passage of the public utilities act in 1912 the California Commission has been a public utility commission.

Bill Provides for Comprehensive Transit Scheme

Development of a system of rapid passenger traffic between New Jersey cities lying within the territory covered by the Port Authority plan and between the municipalities and Greater New York is provided in a bill introduced in the State Legislature. The measure creates a commission of seven members to investigate and report on passenger traffic facilities in the state embraced in the Senate Port Authority treaty. The commission will co-operate with the Port Authority. The bill carries an appropriation of $5,000 for expenses, the commissioners to serve without compensation and to be appointed by the Governor. The bill says the commission shall have power to study and report upon the best plan or plans to be followed in providing a comprehensive scheme of rapid transit between its several communities in North Jersey as well as between such communities and the city of New York.

Interpretation Asked of Recent Wage Award

Employees of the Springfield (Mass.) Street Railway are trying to bring about an early hearing by the arbitrators in relation to certain points in the recent awards the interpretation of which is in dispute. Complaints relate more especially to the application of the provision for a fourteen-hour spread, with guarantee of seven hours pay, for spare men. In a readjustment of schedules the company was enabled to split certain runs in a manner to reduce operating expenses. This is done by shifting men at the carhouses or some other convenient transfer point, so as to avoid paying for dead time. The men contend that the management has no right to take a man off a run before the run is completed, to transfer him to another run. Another contention is that the fourteen-hour spread must be confined to a certain calendar day, which would mean that spare men could not be sent out after 10 o'clock in the morning under this arrangement. It is urged by the men that such a limitation is needed to assure proper rest and sleep between two fourteen-hour spreads. The management expresses confidence that it has correctly interpreted the arbitrators' decision, and says that the fourteen-hour spread is being applied in the same manner as it has been in Worcester for years.

Franchise Settlement Hinges on Auto Regulation

In Decatur, Ill., the Decatur Railway & Light Company, a subsidiary of the Illinois Traction Company, is seeking to negotiate a franchise extension. M. L. Harry, manager for the company at Decatur, recently outlined the conditions that should govern any grant made in that city at this time. He said that the new franchise must protect the company and the public and must be such as to enable the company to establish credit so that it can borrow money for extensions. It must be elastic enough to employ changes in transportation methods should such changes develop and above all it must protect the company against irresponsible, unregulated and unburdened competition.

The matter which looms up as most important in Decatur is one of protecting the company adequately against unfair bus competition. Mr. Harry indicated that until the matter of terms that shall govern bus operation in Decatur is decided, consideration of other terms of the franchise would be a waste of time.

Time Is Extended in Which New Haven May Dispose of Trolleys

In the United States District Court at New York, Judge Hand has signed an order extending until July 1, 1923, the time allowed the New Haven Railroad, by the decree of Oct. 17, 1914, to dispose of certain securities. The original decree was entered in a suit brought by the United States under the anti-trust laws and required the New Haven and the New England Navigation Company to dispose of the stock which they held in the Connecticut Company, the Berkshire Street Railway, the Vermont Company, New York & Stamford Railway, Westchester Street Railway and the Shore Line Electric Railway, as well as bonds of some of the foregoing, and the gold notes of the New England Investment & Security Company.

New Publication in Nashville

The Nashville Railway & Light Company, Nashville, Tenn., is now publishing a monthly magazine called the *Rail-Light News*. The first issue was that of January and started the four-page paper on a successful life by giving just the news the members of the company wished to know.

The magazine not only sets forth the advantages of a laugh in a column adjacent to news of a safety contest and a story of the meaning of the Employees' Mutual Benefit Association but it also tells the latest gossip. He who is attempting to grow a mustache will find his name and his deed duly chronicled in the *Rail-Light News*. The publication is conducted for and by the employees of the Nashville Railway & Light Company and serves as a clearing house for their ideas and their problems.

Death and Destruction Follow Explosion

Seven Men Killed and More Than Score Injured in Compressor Accident in Kansas City

The air compressor tank in an isolated room connected with the machine shops of the Kansas City (Mo.) Railways exploded on the morning of Tuesday, March 7. As a result seven men were killed, an eighth man was seriously injured and twenty others were slightly injured.

The tank that exploded was the main tank used for supplying air in the shops; it was of ⅝-in. steel, 5 ft. by 20 ft., mounted on stanchions. It was attached to an Ingersoll-Sargeant compressor, equipped with safety valve. The tank had a 4-in inlet and a 3½-in outlet pipe. The tank was equipped with pressure gage and a safety release valve. In addition to these guards, there was an "unloader" connected with the pressure piston. This unloader operated automatically; but it also could be operated manually, in case of necessity. The compressor tank was operated under 110-lb. pressure.

Tank and Compressor Isolated

The tank and compressor were located in a room by themselves, near the northeast corner of the one-story structure covering about 200 ft. by 400 ft. constituting the machine shops of the railway at Ninth Street and Brighton Avenue. The tank room was separated from adjacent rooms of the building by brick walls; there being only one door into it from the nearest machine shop room. Adjacent to the tank room was a two-story section of the machine shop structure, the second story being occupied by offices. The second story room of the part of this office section immediately contiguous to the tank room, was used for rest quarters for girls.

One employee had charge of the tank room. Although the compressor equipment was entirely automatic, and could be started in the morning and left unattended normally, this employee was provided as an additional precaution against suspension of compressor service. This employee started the compressor, as usual, when the shops opened at 7:15 a. m., on March 7. He was alone in the room when the explosion took place eight minutes after starting. The walls of the tank room were shattered, both the outer wall of the room, and the brick walls separating it from the other parts of the shop. The compressor attendant was killed; the men injured were in the machine shop rooms adjoining. Part of the floor of the adjacent two-story section fell, but nobody was in that section at the time.

The tank and fittings were destroyed; the only piece of apparatus of importance found to be intact after the explosion was the unloader valve of the pressure piston. This valve was still found to be easily workable with slight pressure.

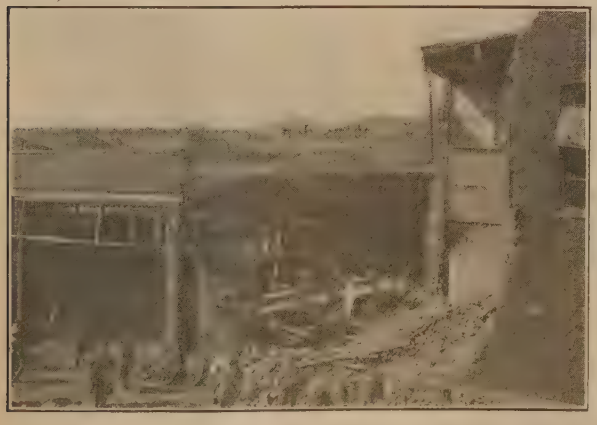
The compressor equipment had been installed about ten years ago, replacing similar equipment that had operated without accident for the previous ten or fifteen years. The equipment which exploded had been rebuilt and overhauled just twelve weeks before the accident; it had been inspected by state authorities within the past month in the usual routine of inspection.

The shops were in operation within two hours after the accident; tarpaulins were spread over the roofs, and car compressors had been built up in series to provide air for replacing the service of the destroyed tank equipment. The following morning the shops were working at 100 per cent of personnel; and the rebuilding of the tank room was in progress.

The property damage amounted to about $20,000, chiefly to the adjacent parts of the building. Windows were shattered in the entire shop building including all the skylights; and in some neighboring houses.

Engineers who have investigated the accident remark that evidently there must have been an extraordinary combination of disabilities in safety factors to produce the accident—one such possible combination in a million chances, when the various safety valves should simultaneously fail to function at a time when pressure reached excessive limits, and the warning of danger be so brief that the attendant could not himself trip a valve. The attendant had been employed solely in the compressor room for many years.

Wall Which Separated the Tank Room from the Adjacent Shop Room Was Destroyed in the Explosion



Looking Into the Small Room Where the Compressor Equipment Was Located

Looking North Through the Tank Room; One of the Tank Stanchions Is Seen Standing, Another Leaning Forward

Fight in Dallas

Railway and City Come to Open Disagreement on Six-Cent Fare and Excess Earnings Disposition

The Dallas (Tex.) Railway and officials of the city of Dallas have come to an open breach over the question of a 6-cent fare and what disposition is to be made of the excess earnings under the 6-cent fare. It has just developed that the Dallas Railway has been applying the excess in earnings over and above the authorized 7 per cent, as provided in the franchise, in paying dividends on the ground that the stockholders are entitled to a return of 7 per cent for the full time the company has been operating under the new franchise, or since October, 1917.

Mayor Sawnie Alldredge and members of the Board of City Commissioners take the position that the excess earnings of the company, earned under the 6-cent fare, granted on June 16, 1920, cannot be used in paying dividends, but must be expended in improvements and betterments, inasmuch as the 6-cent fare was granted with this proviso and because the traction company declared it was not financially able to make certain improvements deemed by the city to be imperative.

The controversy over earnings arose when the Dallas Railway sought approval of a requisition calling for construction of a car line on Forney Avenue to be used by the Dallas-Terrell Interurban in entering the city. The City Commission took the position that the line on Forney Avenue should be built by the interurban company and leased to the Dallas Railway for local street cars, this being the policy in regard to other interurban lines entering the city. The city commissioners declared that the increased valuation by reason of the traction company's building the Forney Avenue line, and the fact that there would be no revenue from such investment, would tend to decrease the earning capacity of the company and would thereby tend to increase fares. This led to an investigation of the traction company's books, and then it was discovered that the excess earnings over and above the 7 per cent since the 6-cent fare was granted amounted to $100,000 and that the traction company had paid out this sum in dividends to its stockholders.

Then, the Mayor wrote W. M. Holland, president of the Dallas Railway, advising him that such use of the earnings of the company neither legally nor morally justified and calling on him to have the stockholders place back in the company's treasury the sum of $100,000 to be used in improvements and betterments as provided in the agreement under which the 6-cent fare was granted. The Mayor at the same time gave notice that the city would open and conduct a hearing on a proposal to reduce street car fares in Dallas to 5-cents.

Mr. Holland, president of the Dallas Railway, took note of Mayor Aldredge's communication and departed for New York and Boston to confer with the owners of the Dallas Railway in regard to the situation and the possibility of the city forcing the traction company to return to a 5-cent fare. The hearing was set for April 6.

The statement issued by Mr. Holland admitting that $100,000 in excess earnings of the company had been distributed in past-earned dividends since the 6-cent fare was granted in 1920 and making the proposal that the stockholders loan the company $100,000 for improvements in part is as follows:

> Dallas Railway will announce "ready" on April 6 on the 6-cent fare hearing. If assured of a reasonable return on their investment the stockholders are ready and willing to loan the Dallas Railway, with which to make necessary extensions, all amounts earned toward making good the deficit in the authorized return, by reason of which there is already available approximately $100,000. The borrowing of this money by Dallas Railway will not increase the property value of the company until the money has been expended for such extensions.
>
> The few weeks I have been connected with Dallas Railway (I assumed office Jan. 3) have convinced me that there are many rapidly growing sections of our city which are badly in need of street car extensions. It will be my policy as president, co-operating with the other officers and with the directors, to make these extensions just as rapidly as the finances of the company will permit. Such extensions should be made in the order of which they are most needed. The company, and I take it, the city, does not want investments made in unprofitable extensions, especially in view of the fact that there are profitable extensions which are badly needed.
>
> I see no good reason why the city authorities and the street car company cannot agree as to which extensions are most needed, and the order in which such extensions should be made.
>
> As an officer of the company and as a citizen of Dallas I am hopeful that our street car sitaution may be settled amicably and in a business-like manner. I know that such a settlement would be best for the company and best for the future growth and development of Dallas.

In reply to Mr. Holland's statement, Mayor Aldredge issued the following statement:

> The street railway company claims that it was within its legal rights in so doing, claiming that the franchise permitted it to take this action. I do not believe this would be true, even if the road were operating under the franchise requirement of a 5-cent fare on account of the fact that the paving obligations are primary and paramount obligations under the franchise and take precedence over the authorized return or the reserve. But I would call attention to the fact that this $100,000 was not earned under the franchise fare of 5 cents, but was derived from the excess profits of the 6-cent fare, which 6-cent fare was granted in order that the improvements could be made.
>
> Certainly the street railway company cannot take the position that the Board of Commissioners is required to grant a 6-cent car fare in order to permit it to pay off all past losses, hence the action in appropriating the $100,000 cannot be defended either legally or morally.
>
> The street railway company's admission that the money has been paid out to the stockholders and the statement that the company might borrow it back from the stockholders is amazing. In other words, the officers have appropriated this money, but now propose to borrow it back from themselves and pay themselves interest on it, which would mean that the people of Dallas would be paying interest to the stockholders of the street railway company on this $100,000, which belongs to the people of Dallas and not to the stockholders. Such a proposition is indefensible.
>
> In good faith and good morals the street railway company should immediately cause to be placed back in their treasury this $100,000, which has wrongfully been disbursed to the stockholders, and use the same for the improvements which the company is under obligation to perform.

Mexico City Strike Aims for Commission Control

Employees of the Mexican Light & Power Company, Mexico City, Mexico, are out on strike with the intention that Mexico City shall have no lights, no trolleys and no water. The Mexico Tramways Company, Ltd., with its subsidiaries, the Mexican Light & Power Company, the Mexican Electric Light Company and the Pachuca Light & Power Company, furnish the railway, power and light service of Mexico City and surrounding towns. The central power plant is at Necaxa.

Employees have endeavored to cut the transmission cable, but have thus far been prevented from doing so by government troops which guard the plant. Trolley service was discontinued on March 2, but water and light are still available and most of the business and residential buildings are lighted, although the streets are darkened.

The strikers are demanding that they be allowed to take over the power, light and street car systems and to operate them under a commission. Early in the strike a cable from Mexico City said that the British Consulate had been closed. London interests head the Mexican companies. This is generally thought to be due to the failure of the government to put an end to the strike.

These companies have had more or less continuous trouble during the revolutionary times in Mexico. In the latter part of 1914 Carranza captured Mexico City. Thereafter labor unions were formed which demanded that wages be raised 25 per cent, that all charges be approved by the unions, and that the company consent to certain operating conditions which would in reality subject the company to union control. The company refused the terms, whereupon the employees went out on strike and operation ceased.

Enough men could have been recruited to provide normal service, but no protection was forthcoming from the government and the danger without protection was too great. The Federal district, under order of the constitutionalist government, took over the operation of the systems and salaries were very shortly doubled or increased 25 per cent. Under this operation maintenance of track and rolling stock was almost entirely neglected.

In May, 1920, the roads were turned back to their owners, but the government paid no indemnity for the period of its operation.

$10,000 for Safety Bonus

The San Diego (Cal.) Electric Railway distributued $10,000 to platform employees recently in "safety checks." The fund is that left over from the accident fund after all claims for injury and damage had been settled. The amount of the check for each individual is based upon the number of hours of service of each employee. The amount of the checks averaged $50 this year, while one man received as high as $77.

Financial and Corporate

$4,464,826 Loss by I. R. T.

$10,511,002 Now Piled Up in Accumulated Deficits Over Three-Year Period

The Interborough Rapid Transit Company, New York, N. Y., in its annual report of operation during the year ended June 30, 1921, shows a deficit of $4,464,826, as compared with a deficit of $2,235,835 for 1920. Gross operating revenues for the year amounted to $55,031,941, comparing with $51,478,410 in 1920, an increase of $3,553,530, or 6.90 per cent. This result was accomplished by a gain on the subway division of $3,204,441, or 10.13 per cent and a gain on the Manhattan Railway division of $349,088, or 1.76 per cent.

The gain in the revenue from the transportation of passengers was $2,933,925, and the increase in the other street railway operating—principally from the sale of power—was $619,604. Operating expenses for the year were $36,024,646, as compared with $31,695,208 the preceding year, an increase of 13.66 per cent, of which 20.19 per cent or $3,667,816 was on the subway division.

COMPARATIVE STATEMENT OF INCOME ACCOUNT

Year Ended June 30	1921	1920
Gross operating revenue..	$55,031,941	$51,478,410
Operating expenses.....	36,024,646	31,695,208
Net operating revenue..	$19,007,295	$19,783,201
Taxes.....	2,735,694	2,623,410
Income from operation.	$16,271,600	$17,159,791
Non-operating income....	639,123	608,368
Gross income.....	$16,910,724	$17,768,159
Income deductions.....	21,375,550	20,003,995
Net corporate income for the year.....	*$4,464,826	*$2,235,835
Add:		
*Surplus, June 30, 1920 and June 30, 1919.....	$7,093,100	$10,152,092
Other credits.....	34,779	5,126
Totals.....	$2,663,053	$7,921,383
Appropriated for:		
Loss upon sale of Liberty Bonds.....	$394,756	.....
Loss upon sale of real estate.....	.....	$809,190
Amortization, capital retirements and other charges.....	25,418	19,091
Total appropriations...	$420,174	$828,282
†Profit and loss—surplus	$2,242,878	$7,093,100
*Deficit.....		

†Stated exclusive of accruals under Contract No. 3 and related certificates payable from future earnings.

The report indicated a net operating revenue of $19,007,295, as compared with $19,783,201 for 1920, a decrease of 3.92 per cent. This was the result of a loss on the subway division of $463,374, or 3.44 per cent, and a loss on the Manhattan Railway division of $312,532, or 4.94 per cent. The income from operation was $16,271,600, a decrease of 5.17 per cent, as compared with $17,159,791 for 1920, while non-operating income stood at $639,123, as against $608,368 the preceding year. This increase of 5.05 per cent was explained by the increase of $44,605 on the subway division, although non-operating income on the Manhattan Railway division decreased $13,850 during the year, or 18.84 per cent.

Income deductions amounted to $21,375,550, as compared with $20,003,995 for 1920, an increase of 6.85 per cent. Details of the year's operation, as compared with 1920, are set forth in the accompanying table.

In his remarks to the stockholders President Frank Hedley said in part:

The number of passengers carried was 1,013,678,831, compared with 955,133,110 last year, an increase of 58,545,721, or 6.13 per cent, the result of a gain on the subway division of 53,287,147, or 9.02 per cent, and a gain on the Manhattan Railway division of 5,258,574, or 1.42 per cent.

The gain on the subway division reflects the increase in passenger business incident to the operation of the new lines constructed and equipped under Contract No. 3 and operated in connection with the old subway lines.

The sum of $8,418,325 was spent during the year for maintaining the structure, roadway, power houses, electrical equipment and rolling stock in good operating condition. This sum included the renewal of rails on 2.5 miles of single track and 24,316 ties on the Manhattan Division and 13.92 miles of single track and 10,149 ties on the Subway Division; $4,669,264 was spent for additions and betterments to the property.

Your property was operated during the last year at a loss of $4,464,826, notwithstanding the practice of every economy it was possible to conceive. The net revenue, after the payment of operating expenses and taxes, was insufficient by this amount to meet the interest and sinking fund on the 5 per cent bonds and 7 per cent notes issued for construction and equipment of road in operation. This is the third consecutive year of cumulating deficits, the company having failed to earn its fixed charges in 1919 by $3,810,339 and in 1920 by $2,235,835.

The increase in the deficit this year over the year 1920 was caused by increased charges for operating expenses, taxes and for interest and sinking funds aggregating $2,259,705 in excess of the increase in gross operating revenue for the year. These accumulated deficits totaling $10,511,002.25 have so far as possible been taken care of by the application of the remaining surplus, the sacrifice of assets and the forbearance of our creditors, in order to keep the service going and avoid a condition of disintegration and chaos similar to that now existing on the surface lines.

Notwithstanding these deficits the growth of traffic has been continuous. In 1905 the subway and elevated lines combined carried 339,104,820 passengers. This number increased gradually with each year until 1921 these combined lines, including the recent additions, carried 1,013,678,831 passengers. In 1905 the number of passengers carried per mile of track was 2,214,634, while in 1921 it was 2,773,479, an increase of over 25 per cent in the face of an increase in the mileage of over 138 per cent. Since the opening of the new lines in the latter part of 1918, there has been an average increase of 81,000,000 passengers per annum. The present subway ramifications have more than reached their limit on a 5-cent basis and to attempt anything further would be entirely to disregard all economic laws.

First Dividend in Four Years

The directors of the Worcester (Mass.) Consolidated Street Railway on March 13 declared a dividend of $2.50 a share on its preferred stock. This is the first dividend declared by the company in four years. It is payable on April 1.

United Traction Report Forecasts a Brighter Future

The report of the United Traction Company, Albany, N. Y., for the quarter ended Dec. 31, 1921, shows a more hopeful outlook for the return of this company to a normal basis. Although the operating revenues for the quarter ended Dec. 31, 1920, were $227,290 more than in the same quarter for 1921 still the expenses for the 1921 quarter were decreased by the sum $270,083.

The net deficit from railway operation in the last quarter of 1920 amounted to $30,493 while in the last quarter of 1921 there was a net gain of $12,301.

The traffic in the last quarter of 1921 increased considerably over the third quarter of the same year. The number of passengers advanced from 3,540,995 in the third quarter of 1921 to 8,824,574 in the last quarter.

The report submitted makes also a comparison of the entire year operation against operation in 1920. The effect of the strike is seen in a comparison of these figures. The total revenues for 1920 amounted to $3,253,973 and in 1921 they were $1,197,783. The net corporate income for 1920 was a loss of $416,510 and for 1921 the railway company reported a loss of $2,208,409.

Oakland Property Realizes Surplus of $49,297

At the annual meeting of the stockholders of the San Francisco-Oakland Terminal Railways, Oakland, Cal., which was held in the company's offices on March 7, 1922, W. R. Alberger, vice-president and general manager, said, among other things, that the general business depression of the year 1921 had not materially changed the company's condition and that it was in practically the same position at the end of that year as it was at the close of the year 1920. He stated further that better service had been provided in 1921 than during the previous year by putting more cars in service, which increased the car mileage from 16,849,400 in 1920 to 16,887,649 in 1921 and that the improved service caused an increase in car-hours from 1,672,865 in 1920 to 1,684,088 in 1921.

The company's gross operating revenue amounted to $6,872,597 and operating expenses were $4,853,032. The final surplus of the year was $49,297. It was stated that the revenues of the company for the year 1921 compare favorably with those of the previous year, regardless of the fact that certain decreases were suffered by the gradual closing down of the shipping industry and the general downward trend of business during 1921.

The stockholders were informed that the federal, state, county and Municipal taxes for the year 1921 increased 14.75 per cent as compared with the year 1920 and that the increase was practically all due to taxes paid the State of California.

Mitten Men Elected

Bolting Directors All Deposed at Annual Meeting of Stockholders on March 15

Thomas E. Mitten had it all his own way at the meeting of the stockholders of the Philadelphia (Pa.) Rapid Transit Company on March 15. The entire slate of directors sponsored by him was elected to the board. The vote was overwhelming. In fact, it was unanimous, as the opposition chose to remain silent. It was the largest vote ever cast at any election of the stockholders. All of the 520,637 shares voted were in favor of the Mitten slate. There are 600,000 shares outstanding. This reduces to figures the measure of the Mitten victory. Thus another important step was taken in the policy of management and men toward the perfection of which Mr. Mitten has been working ever since he took hold of the property more than ten years ago.

The slate of directors as now constituted consists of T. E. Mitten, W. C. Dunbar, G. A. Richardson, C. J. Joyce, H. G. Tulley, Nelson Robinson, John W. McElroy and Dr. A. A. Mitten. Mr. McElroy and Dr. Mitten represent the employees on the board. Mr. McElroy is the president of the Employees' Co-operative Welfare Association. Dr. Mitten is the understudy of Mr. Mitten in the co-operative welfare work.

Dividends Ahead

These briefly are the outstanding facts of the election. There is much more to the story, however, than the mere recording of names. It is the ideas behind the names that count and these as the management sees them are (1) service to the community; (2) management in the true interest of the security holders; (3) participation in the financial results achieved by the employees who make the results in dollars possible. If the hopes of President Mitten and his fellow co-operators are attained then after the payment of dividends of 6 per cent to the stockholders has been made for 1922 the employees will participate for their super-co-operation during the year in an amount not to exceed 10 per cent of the payroll.

There have of course been employee directors of electric railway companies before, but never before have the same elements of unity been combined as now in Philadelphia. The whole situation was, perhaps, summarized best by Mr. Mitten in a short speech which he made at the demand of the employee stockholders at the conclusion of the meeting. He said that the incidents of the meeting with its consummation in the election of the slate sponsored by him made quite worth while the eleven years of toil and effort which have marked his management of the property. The responsibility has been great, but he now recognized an added responsibility and was sure the men recognized it. Everything that had recently been said about the prospects for the future under the new order must be made good. A year ago the stockholders were told that the need existed for putting the property back into the very best shape following the retrenchment necessary during the war-time period. That work has in the main been carried out. The day for dividends was dawning. A great furore had been made in some quarters about one-man management. Mr. Mitten said there was no one-man management. There was, however, one-man leadership. In conclusion Mr. Mitten said that never would the employees regret their vote of March 15 if proper co-operation were continued with the management.

Directors Operating Experts

These are the directors who will serve the company during 1922: T. E. Mitten, W. C. Dunbar, G. A. Richardson, C. J. Joyce, H. G. Tulley, Nelson Robinson, John W. McElroy, Dr. A. A. Mitten, the Mayor and two city directors, appointed by the City Council by virtue of the 1907 city contract. Mr. Mitten with four immediate associates, Messrs Dunbar, Richardson, Joyce and Tully, representing the highest developed skill in their particular lines, as directors will also serve as the executive committee, reporting monthly to the board of directors. Mr. Dunbar is vice-president in charge of finance and accounting; Mr. Richardson is vice-president in charge of operation; Mr. Joyce is counselor to the company; Mr. Tulley although president of the International Railway, Buffalo remains the responsible head of the co-operative welfare activity in Philadelphia under the Mitten management. It is conceded that Mr. Tulley, perhaps more than any other man, is responsible for solving the labor problems of the P. R. T. Mr. Robinson is a capitalist and philanthropist. He has supported and backed Mr. Mitten in Buffalo and elsewhere since 1900 and is a believer in the Mitten policies and management. He has been a regular attendant at Mr. Mitten's meetings with his men during the ten years of struggle and accomplishment in Philadelphia. Brief sketches of Mr. McElroy and Dr. Mitten appear in the department "Personal Mention," elsewhere in this issue.

Meeting in Democratic Surroundings

As for the meeting itself it convened at 11 a.m., in the room of the Co-operative Welfare Association at the Luzerne carhouse. Of the mechanics of the meeting and the voting nothing need be said. There was a very large attendance. Although the great bulk of the voting was done by proxy a number of the employees insisted upon casting their own votes. Among the attendants were a number of ladies, among them Mrs. Rudolph Blankenburg, wife of the late Mayor of Philadelphia. Mrs. Blankenburg is a stout supporter of the Mitten policies. Only two of the bolting directors, Messrs Matthews and Tripple attended. They were conspicuous by their silence. The directors who were replaced were W. J. Montgomery, William Y. Tripple, Frank Buck, C. J. Matthews and W. J. Montgomery. The men who replaced them were Dr. Mitten, Mr. Tulley, Mr. Joyce, Mr. McElroy and Mr. Robinson.

The deposed directors were reticent about making any statement after the meeting. Mr. Matthews, however, said:

> We are through as directors. We made a pretty fight, and we came out the wrong end. We made no great appeal for support—we merely sent out our announcements and did not go further.

In view of the developments at the meeting the remark may readily be believed that was reported to have been made by one of the deposed directors that when Mr. Mitten had an idea he usually acted upon it thirty days before anybody else who happened to have the same idea at the same time.

Officials Ready to Discuss Separation of Properties

In his annual report W. Kesley Schoepf, president of the Cincinnati Traction Company, stated that the total number of revenue passengers carried on the Cincinnati Traction and Millcreek Valley lines for 1921 was 106,527,759. The previous year the total was 118,618.862. Estimates furnished the city officials indicate that the present rate of fare will furnish sufficient revenue to meet all expenses for the year 1922 with the exception of the amount necessary to pay the franchise tax.

Traction company officials, Mr. Schoepf said, were now ready to meet Mayor George P. Carrel's Committee to discuss readjustment and the separation of the properties of the Cincinnati Traction and the Cincinnati Street Railway companies.

President Schoepf declared that traction companies throughout the United States had experienced the worst slump in years. He also outlined a number of proposed improvements and said that consideration would be given to the "trackless trolley" this year in the suburban districts.

Announcement of Discontinuance Expected

It is generally understood in electric railway circles in Hartford that announcement may be made any time of the discontinuance of the interurban railway service between Hartford, Conn., and Rockville. Should the order be made, the Connecticut Company proposes to establish a half-hour service between the two places by means of surface cars. The interurban runs for most of the distance over the steam tracks of the New Haven Road. The Connecticut Company has threatened before to discontinue the interurban service, but the Public Utilities Commission has insisted that operation be continued.

Municipality officials of Rockville are protesting the abandonment of the service. It is contended by the Connecticut Company that the line is and has been for some time a losing proposition. That the line will be abolished is now almost certain.

Minnesota Commission Concludes Hearings in First City Railway Case

Valuation Estimates Presented by Engineers for Company — Cost of Power Contract Item of Value

On Feb. 28 at St. Paul attorneys submitted oral argument in the Duluth Street Railway valuation and fare case, now under consideration by the Railroad & Warehouse Commission of Minnesota. As this is the first street railway valuation and rate case to come before the commission, the decision is awaited with much interest, especially as this commission will not be hampered by earlier precedents of its own and will have the benefit of the more recent decisions of the leading commissions and courts, which are now taking a broader view of the valuation problem. The tendency of later decisions is to restore the credit of these essential utilities and eventually return them to a normal basis as set forth in the recommendations of the Federal Electric Railways Commission, of which Charles E. Elmquist, formerly of the Minnesota Commission, was chairman.

In order that the commission might have full data as to this property in its first electric railway case the railway company made special effort to submit very complete evidence as to the valuation of the property, the earnings and the financial predicament of the company, which is much the same as that confronting practically all other electric railways, viz., the necessity of obtaining new capital for extensions and improvements of service with existing low market prices on electric railway securities and inability of the company to earn sufficient net to justify issuance of additional securities under the terms of their trust deed.

The evidence was submitted in hearings at Duluth and St. Paul during January and February, at which time A. L. Drum & Company, consulting engineers, Chicago, submitted a report on the cost of reproducing and developing the property of the Duluth Street Railway. An inventory was made of the Duluth Division of the property as of July 1, 1921, and the final report of the engineers estimated the cost of reproducing and developing the property on the following bases, a summary of these valuations being given in the accompanying table: (1) pre-war cost, using current prices as of the year 1915; (2) ten-year average cost, using average of prices for the ten-year period 1912 to 1921, inclusive; (3) present day cost, using current prices as of June 1921; and (4) estimated original cost, using prices in effect as of the date the various parts of the property were installed or purchased.

An interesting feature of this valuation was the method adopted for valuing the power contract. The company purchases all of its primary power from the Great Northern Power Company, an independent hydro-electric power company. During the development of this source of power supply the railway was obligated to retain its own power plant as a stand-by plant from September, 1907, when the power company first delivered power until the power company released the railway from this item of the contract and the plant was sold in 1916.

The railway was required to pay the insurance taxes and interest on the plant from 1907, as well as suffer the loss of the investment in the plant (less salvage) at the time of abandonment. These items, constituting the actual expenditures of the railway in obtaining the power contract and perfecting a satisfactory source of power supply, were ascertained and reported as the value of the power contract.

Mr. Drum testified that the item of developmental costs represented a measure of the developmental and going concern value and indicated the costs that have been or would be encountered in creating and developing the property to its present state of efficiency. The expenditures for obsolete equipment and construction represent the capital included in the development of the property which has been superseded and replaced prior to the expiration of its useful life. The cost to unify the system represents an estimate of the cost incident to creating and consolidating the various companies into one system, now comprising the Duluth Street Railway Company, Duluth Division. The item included for loss of interest during operation represents the estimated deficit of return on the investment during the early period of operation up to the time the business had become established on a paying basis, which loss was estimated to be equivalent to one year's loss of interest of 8 per cent on the investment.

Mr. Drum also submitted the accompanying table, showing an estimate of the operating income for the year 1922 based on different rates of fare, with allowance made for decrease in passengers due to increase in fares.

THE DULUTH STREET RAILWAY, DULUTH DIVISION, ESTIMATED OPERATING INCOME FOR THE YEAR 1922

Based on Actual Passenger Fares and Revenue Car-Miles for the Year 1921.
Allowance Made for Decrease in Passengers Due to Increase in Fares.

	Rate of Fare				
	5 Cents	6 Cents	7 Cents Cash Six Tickets for 25 Cents	7 Cents	7½ Cents
Revenue passengers	27,200,000	26,112,000	25,568,000	25,024,000	24,480,000
Estimated decrease	None	4%	6%	8%	10%
Car-miles	3,300,000	3,300,000	3,300,000	3,300,000	3,300,000
Passengers per car-mile	8.24	7.91	7.75	7.58	7.42
Operating revenue:					
Passenger revenue	$1,360,000	$1,566,720	$1,636,352	$1,751,680	$1,836,000
Other operating revenue	14,000	14,000	14,000	14,000	14,000
Total operating revenue	$1,374,000	$1,580,720	$1,650,352	$1,765,680	$1,850,000
Operating costs:					
Operating expenses	$1,010,130	$1,010,130	$1,010,130	$1,010,130	$1,010,130
Depreciation	134,303	134,303	134,303	134,303	134,303
Taxes	80,464	106,304	115,008	129,424	139,964
Total operating costs	$1,224,897	$1,250,737	$1,259,441	$1,273,857	$1,284,397
Operating income	$149,103	$329,983	$390,911	$491,823	$565,603

THE DULUTH STREET RAILWAY—DULUTH DIVISION

SUMMARY OF COST OF REPRODUCING AND DEVELOPING THE PROPERTY AS OF JULY 1, 1921

	Pre-War Cost Prices Current Year 1915	Ten-Year Average Cost Average Prices 1912-1921	Present-Day Cost Prices Current June, 1921	Estimated Original Cost Prices Current At Date of Installation
Physical property:				
Cost to reproduce new	$4,828,084	$6,473,578	$8,220,384	$4,826,725
Power contract:				
Cost of power contract	379,542	379,542	379,542	379,542
Total	$5,207,626	$6,853,120	$8,599,926	$5,206,267
Developmental costs:				
Expenditures for obsolete equipment and construction	$693,688	$693,688	$693,688	$693,688
Cost to unify system	50,000	50,000	50,000	50,000
Loss of interest during operation	386,247	517,886	657,631	386,138
Total	$1,129,935	$1,261,574	$1,401,319	$1,129,826
Total cost of reproducing and developing the property	$6,337,561	$8,114,694	$10,001,245	$6,336,093

Bondholders Seek Greater Part in Receivership

Changes under the receivership of the Toledo & Western Railroad have been suggested by attorneys who appeared in Judge John M. Killits court at Toledo, Ohio, to object to motions now on file to expend earnings for improvements to the property and new equipment. It is alleged that of the $50,000 or more of earnings none has reached bondholders. The bondholders will seek representation in the receivership. They also ask that the court order payment in full of all stock subscribed for at the time the road was built and through later financing.

Attorneys for the receivers, J. Frank Johnson, operating head, and Harry Dunn, of the Ohio Savings Bank & Trust Company, and attorneys representing bondholders and Henry L. Doherty & Company, were requested to get together on the matter and work out a plan to be presented soon to the court.

As Wall Street Sees It

Financial Authority Says Interests of Stock and Bondholders Are Cared For Under Commission Plan

The *Wall Street Journal* says that there appears in general to be no indications that a material disturbance of present security prices would attend upon the electric railways in New York accepting the Transit Commission's estimates of the values of the properties and assenting to the proposed plan of consolidation—an end which at present appears somewhat doubtful. Opening of negotiations with a view of accepting a plan in line with the commission's proposals may cause an appreciation in market values as strength of company claims develops in cases, for example, of companies having extensive non-operating property, valuable leases, and contractual obligations of potential value, such as preferential payment features of dual subway contracts, and large accruals payable from future earnings.

TITLE TO OPERATING PROPERTY TO BE VESTED IN CITY

It will be recalled that the commission proposes that companies vest title to their operating property in the city and take in return an equivalent in value of securities of a new company that is to be brought into existence. A further consideration shall be that companies, brought into a unified system and grouped in a manner prescribed by the commission, shall receive back new leases under which they will continue to operate privately but under the general direction of a Board of Control. New securities properly guaranteed are to be the sole basis of exchange, and it is for the purpose of making this exchange that valuations have been made.

The *Wall Street Journal* says:

The probability of interests of stockholders as well as bondholders being taken care of in the exchange is introduced by the plan of the commission which requires each company accepting the plan to take care of its own securities of whatever value, in its own way, and through a reallotment of new bonds among old security holders.

Property in Brooklyn Rapid Transit system which is useful for operation has been valued by the Transit Commission at $154,608,677; securities of the system representing a par value of approximately $227,000,000, had a market value on Feb. 16 around $108,000,000. Operating property of Interborough system (I. R. T., Manhattan Railway, and New York Railways—the latter including Eighth and Ninth Avenue companies as well as New York & Harlem) are valued by the commission at $261,476,046, while outstanding securities equal at par to $497,000,000 have a market value of $227,000,000. Commission values Third Avenue system at $33,967,430, while securities at par approximating $70,000,000 are appraised in the stock market slightly in excess of $35,000,000. Commission's valuation did not include property of three subsidiary companies operating in Westchester County.

ESTIMATES BY BOTH SYSTEMS

In addition to evaluating operating property of all traction companies based on original costs less amount necessary to put each property in first class operating condition, which basis the commission's bureau of valuation recommended for use in making the exchange, the commission announced a valuation of all operating and non-operating property based on cost to reproduce at 1921 prices less depreciation. Following are both estimates by systems:

Systems:	Valuation Recommended	1921 Prices Less Dep.
Brooklyn Rapid Transit...	$154,608,677	$194,756,352
Interborough Rapid Tran.	174,221,056	174,221,056
Original Manhattan Ry...	57,374,205	65,610,942
New York Railways (including 8th, 9th, and N. Y. & Harlem Railroad Co.)	29,871,785	75,261,442
Third Avenue	33,967,430	57,207,122
Second Avenue R. R. Co..	4,798,317	8,889,364
Staten Island companies..	4,215,713	5,470,070
Queens Borough com.....	6,125,764	10,935,600
Miscellaneous companies.	497,207	716,061
Total.....	$465,680,154	$593,078,009

The *Wall Street Journal* says that the different bases of these estimates and the fact that non-operating property is included in one and not in the other, in some measure explains the difference in values for any system. Extent of accrued depreciation on the various systems also accounts for discrepancies as well as for lack of uniformity among the systems in relative differences between appraisals. Accrued depreciation on New York Railways property amounted to approximately 30 per cent of cost to reproduce; Third Avenue about 34 per cent; Manhattan Railway 25 per cent and Interborough 4 per cent. Percentages of non-operating property to total property varied from 14 per cent for New York Railways, 11 per cent for Queens companies and 6 per cent for Third Avenue, to 0 per cent for Interborough. Total of all non-operating property based on cost to reproduce in 1921 was $36,968,820. A tabulation of the commission's appraisal of land owned by systems as of June 30, 1921, follows:

System:	Land Not Useful For Operation	Land Used For Operation
B. R. T.....	$2,494,077	$6,912,389
I. R. T.....	950,000	5,618,508
N. Y. Rys.....	2,460,800	9,474,600
Third Avenue...	1,424,348	3,029,598
Second Avenue..	84,000	565,000
Staten Island companies..	49,700	133,700
Queens companies.....	155,251	195,940
Total.....	$7,618,587	$25,929,735

Total property of all systems not used in operation, on basis of original cost less depreciation, is $13,259,920, of which land ($7,618,587) is the largest single item. Track and structures total $4,239,309; electrical equipment $1,014,236 and incidental expenses $387,788.

Receivers Appointed

The Dayton, Covington & Piqua Traction Company, operating between Dayton and Piqua, Ohio, was placed in the hands of receivers on March 13, on application of the International Trust Company, Boston. The petition, which was filed in the Federal District Court at Dayton, cited that the traction company had defaulted in the payment of $60,000 interest due on second mortgage bonds held by the trust company. The court appointed President Wert Kessler, West Milton, Ohio, and Vice-President T. Russell Robinson, Boston, as receivers. Company officials, pointing out that the company has been enjoying a good business, say that the trouble will be smoothed over without difficulty. The company has been operating the line for twenty-two years.

Financial News Notes

Same Officers Elected.—All officers and directors of the Pine Bluff Company were re-elected at the annual meeting of the stockholders and directors, recently held in Pine Bluff, Ark. Plans for the future were discussed but no definite program was decided upon.

Seven Per Cent Bonds on Sale.—Reilly, Brock & Company, Philadelphia, Pa., are offering $150,000 of the Georgia Railway & Power Company's general mortgage 7 per cent bonds due Nov. 1, 1941. The bonds are offered at 101½ and interest to net over 6.85 per cent.

Ashtabula to Vote on Municipal Purchase.—At a special election on April 24, voters in Ashtabula, Ohio, will decide whether the city shall purchase the property of the Ashtabula Rapid Transit Company. The company owns 5.5 miles of track and leases 1 mile. It operates the Ashtabula & Lake Shore Railway.

$7,500,000 Bonds Offered.—The National City Company, New York, N. Y., is offering $7,500,000 of The Northern Ohio Traction & Light Company's general and refunding mortgage gold bonds Series A 6 per cent dated March 1, 1922, and due March 1, 1947. The price of the bonds is 96 and interest to yield more than 6.30 per cent.

Increased Capital Authorized.—Stockholders of West Penn Railways, Pittsburgh, Pa., have authorized the board to increase the capital from $20,000,000 to $30,000,000. The present capitalization is $10,000,000 of common stock and $10,000,000 of preferred. The new stock is to be common issued from time to time for corporate purposes.

Valuation Case To Be Continued.—The valuation case of the United Railways, St. Louis, Mo., was taken up again by the Missouri Public Service Commission on March 6, and after sessions lasting three days was continued until March 27. W. B. Bennett and F. W. Doolittle, consulting engineers representing the company, were examind at length. It is expected that testimony in the company's case will be concluded at the next hearing. The city will then be heard.

Detroit Bonds Offered.—Kuhn, Loeb & Company, Hallgarten & Company, and Kidder, Peabody & Company, New York, N. Y., are offering $14,500,000 of the city of Detroit's 4½ per cent and 5 per cent bonds. Included in this amount is $1,000,000 of 4½ per cent public utility bonds (street railway). These are coupon bonds dated Jan. 15 and July 15 and mature Jan. 15, 1932. The principal and interest are payable semi-annually in New York City or in Detroit. These "street railway" bonds are offered at 100¾ to yield approximately 4.40 per cent.

Traffic and Transportation

Subway Crowding Must End

New York Commission Apparently Prepared to Insist on Adoption of Its Own Standards of Service Irrespective of the Results Upon the Company Financially

The New York Transit Commission and the Interborough Rapid Transit Company are at the parting of the ways. At least the differences between them seemed to be irreconcilable at the termination of the hearing on March 15. The commission appears to be determined to require from the company a fuller measure of service than is now being given, while the company insists that it can only carry on successfully and avoid receivership by further indulgence from the commission. The members of the commission finally declined to adjourn the hearing on the traffic conditions for thirty days.

COUNSEL for the commission thought that body had been very tolerant, as tolerant as it could be, taking into consideration the public interest and all the other interests. The time had come, however, when a different policy must inevitably be considered by the commission. Recognizing that fact the commission, Mr. Shearn said, had done two things:

1. It had prepared a plan that would give relief and that would enable decent service to be given to the public, and at the same time take care of every dollar of real value that there was in these properties.

2. Contemplating the possibility that the companies were going to flout the commission's plan and disregard its tolerant attitude in the past, the commission proposed to exert its police power and require better service.

Mr. Shearn said the companies must face that situation and every day's delay spelled a continuance of indecent conditions.

Mr. Quackenbush, counsel for the company, entered a plea at the outset for the commission to let the matter stand over for a period of thirty days. He believed that the officers of the company would then know and be able to state to the commission whether they could reach any agreement with the Manhattan Elevated Railway with regard to securing modifications of the terms of the lease under which that property is operated by the Interborough. If the officers could be free for the next three weeks they would probably be able to do a great deal more that in a way would be helpful to the public than they could do if they were obliged to suspend all other things and take up the question of schedules and other intricate matters involved in rearranging the service.

Mr. Quackenbush said that he knew that he had made a pretty long speech but he felt he should state the thing thoroughly so that the commission would get the company's point of view about the matter. He said:

> I will say to the commission as I have said to the Manhattan people, the Interborough Rapid Transit Company cannot under a 5-cent fare and existing conditions continue to pay the rental at the rate of 7 per cent. We hope that some ajdustment can be made that will enable us to go on. If the Manhattan Company should not see it that way or there should be no basis available for a compromise, then I should expect to say to Judge Mayer at the adjourned day as I would say to the commission, we can't go any further and we will have to face the inevitable.

Mr. Quackenbush then said that it was not reasonable to expect the Interborough to become familiar in so short a time with the valuation figures prepared by the commission. He called attention that the reports of the commission indicated that the deficit for the six months ended Dec. 31 was $1,937,000, compared with a deficit for the six months ended Dec. 31, 1920, of $2,682,000, and for the same six months of 1919 $1,900,000. He explained that the deficit for the last six months of last year was about the same as two years ago and about $682,000 less than in 1919. This gain, he said, had been made because the employees consented last July to accept a 10 per cent reduction.

Commission Counsel Wants Guarantees

Mr. Quackenbush assured the commission that he and President Hedley were anxious to co-operate in giving the public all the service possible, with the reservation that the company did not want to extend this service to the extent of forcing the company into a receivership.

Mr. Shearn asked Mr. Quackenbush if his company would guarantee that if it got the requested adjournment the service on the subways would be increased to the point attained in 1916, and Mr. Quackenbush replied that the question was a pretty big one. He did not know, he said, what were the standards of six years ago. Then Mr. Quackenbush said:

> My disposition is not litigation. My disposition is candor. And if this commission will at any time make an order that is beyond our power to carry out, of course I shall take it into the Appellate Division and ask to set it aside. That is the best answer I can make. I cannot translate your inquiry into terms of money. We lay the whole facts before you. You can tell what this corporation can do just as well as I can.
>
> I cannot underwrite the financial ability of the future, tomorrow or two weeks or thirty days from today of the Interborough Rapid Transit Company. It is in a perilous condition. I have made no concealment of it. The light seemed to be breaking a little for it. But if it escapes a receivership I think it will be due to the indulgence of this commission about as much as anything else. And, of course, any order of the character that you mention, Judge Shearn, would mean a receivership.

Mr. Shearn said that he asked the question, not that he expected any different answer, but to make it clear that the commission was really at the parting of the ways with the company in giving it further time in which to wrestle with the receivership problem. He then said:

> The whole matter, as I see it, comes down to this. We are dealing not with a matter of a threatened receivership, but with the obligations of the Interborough Rapid Transit Company under its contract.

There was some controversy over the authority of the commission to exercise both its police power and its power over the company's contract with the city. Mr. Quackenbush said that if the powers were mixed he would ask the courts for a review of the matter. He insisted that if the commission intended to issue orders that would force the company into a receivership, it should so act as to leave an open path for the company into the courts, where a demand could be made for a review. In illustration of what he meant Mr. Quackenbush said:

> I say, if the commission makes an order of the character which is indicated, I shall immediately cite the case of the International Railway in Buffalo, where the Court of Appeals said that you cannot make an order that disregards the financial ability of the corporation to carry it out. That illustrates what I mean.

Mr. Quackenbush said that whatever crisis existed in the transit situation several months ago had disappeared as soon as the holiday rush was over and conditions were no worse than three months ago, when there was no cry for increased service. He admitted that the service should be improved. Mr. Shearn, summing up the position of the commission, said that it was not concerned in the negotiations between the Interborough and the Manhattan companies, but that "the commission was concerned with the attitude of both companies with respect to its plan."

Service Reported to Be Suspended in Augusta

According to the New York *Evening Sun* of March 16 all electric cars in Augusta were withdrawn from service on that day by the Augusta-Aiken Railway & Electric Corporation as a protest against the neglect of the City Council to regulate jitneys. According to the newspaper report, the company had announced that its cars would remain in the carhouse indefinitely until the matter was settled.

A telegram to the management of the company in Augusta for confirmation of the report resulted in the suggestion that information could be secured from the J. G. White Management Corporation in New York, operators of the Augusta property. Inquiry at the office of that company, however, elicited the statement that the company was unaware whether the service had been suspended in Augusta or not.

One-Man Car and Denial of Bus Permits Approved

The committee appointed by Mayor Hackett of Albany, N. Y., to investigate the service rendered by the United Traction Company and to offer suggestions for its improvement has submitted its report. The Mayor made no comment on the report other than that he would probably recommend at the next session of the City Council that the provisions of the report be carried out.

Much of the report deals with the subject of the one-man car which the committee says it was at first opposed to, but after a very careful investigation it believes that the one-man car is here to stay and that "we should endeavor to co-operate with the traction company management to get a maximum of efficiency from this service." The committee expressed the opinion that with the one-man cars the United Traction Company could pay a fair wage to its employees and make a reasonable return to its stockholders on a 5-cent fare. The committee went further and said that Mr. Weatherwax had said that it was the plan of the company to reduce the fare gradually until it gets back to the 5-cent fare.

The committee favored no further permits for the operation of buses because it was of the opinion that bus operation interfered with the operation of the electric railway cars. Accordingly, numerous parking orders and restrictions were recommended.

Some further provisions were outlined on an increase in service such as through cars to carry West Albany workmen. Patrons of the United Traction Company were urged to purchase tokens. In concluding its statement the committee urged co-operation by the public and recognized the traction company's efforts to give the citizens of Albany a satisfactory service.

Higher Court Rules Against Increased Rates

The Ohio Traction Company is barred from increasing fares from Wyoming, Ohio, to the Zoological Garden from 5 to 7 cents for adults and from 3 to 3½ cents for children, in an opinion handed down by the Ohio Supreme Court. The case was taken to the Supreme Court by Attorney Henry B. Street, Solicitor of Wyoming, through the Court of Appeals from the Court of Common Pleas of Hamilton County in which a decision was rendered in favor of the traction company.

The contention raised by Attorney Street against the suit filed by the traction company was that a franchise contract was still in force between Wyoming and the Ohio Traction Company, signed in March, 1900, and valid for twenty-five years. The franchise provides for a 10-cent fare from Wyoming into Cincinnati and a 5-cent fare from Wyoming to the Zoological Garden.

The issue upon which the traction company based its prosecution was a franchise entered into between it and the city of Cincinnati, one clause of which provided that the same rate should be charged by traction lines entering the city as those operating within the city. The Ohio Traction Company therefore sought to raise the 5-cent fare to one nearly equal to that of the Cincinnati Traction Company operating within Cincinnati. The Cincinnati Traction Company is a subsidiary of the Ohio Traction Company. The Supreme Court decided that the franchise contract existing between Wyoming and the Ohio Traction Company was complete in itself and could not be affected by any extraneous contract.

One-Man Cars Approved

One-man cars, as developed and operated by the Washington Railway & Electric Company, Washington, D. C., are to the interest of safety and economy, in the opinion of the Public Utilities Commission of the District of Columbia. The attitude of the commission was made known in the findings of the rate case of the Washington Railway & Electric Company and the Capital Traction Company. The commission's finding approves the recent devices used, as a conspicuous handle for opening each of the doors when released in emergency and two extra lights over the doorways which are lighted when the doors are opened. The order for the ventilation of cars is based upon that which would be adequate for a lightly loaded car, with a provision for further ventilation as required. Temperature of the cars, between Nov. 1, and April 1, shall not fall below 40 degrees F.

Petition Reduction in Salt Lake City

A petition for a reduction of the fares charged by the Utah Light & Traction Company, Salt Lake City, to the pre-war scale, has been presented to the Public Utilities Commission. The cash fare has been raised from 5 cents to 7 cents, the commutation ticket from 4 to 6¼ cents and students tickets from 3 to 4 cents since 1917.

The petition states that the commission held these increases justified on the ground that all materials, such as ties, steel rail, equipment and copper, as well as wages, had increased in price until they had become abnormally high.

It further points out that during the past year there has been a decided falling off in the prices of all commodities; ties have dropped in price from 25 to 40 per cent; steel rails from 10 to 25 per cent; copper wire from 25 to 50 per cent, and there has been a general reduction in the cost of all materials used by the company. On May 1, 1921, the wages of the employees of the company were cut 10 to 16 per cent, at a saving to the company of at least $120,000 per annum the petition concludes.

Davenport Mayor Wants Five-Cent Fare

Mayor C. L. Barewald of Davenport, Ia., candidate for re-election on the democratic ticket, announced recently that he would work for a 5-cent fare if re-elected. The present fare in Davenport is 8 cents. Mayor Barewald announced that he does not favor the monthly identification plan offered by the Tri-City Railway. By this card plan the passenger pays 50 cents a month for a card and then pays a nickel cash fare. The passenger who does not have a card pays a straight 10-cent fare. Four tokens may also be purchased for 35 cents or a fare of 8¾ cents a ride.

This card plan went into effect on March 1 on the lines of the Tri-City Railway in Illinois, serving the towns of Rock Island and Moline. President B. J. Denman of the company reports that it is working well there and states that the sale both of identification cards and of tokens has gone beyond expectations.

City Restrained

Little Rock city officials have been restrained from putting into effect an ordinance recently passed reducing the fare there to 5 cents by an order issued by Federal Judge Jacob Trieber. The order preserves the status quo in the suit of the Little Rock Railway & Electric Company against the city, asking temporary injunction against the enforcement of the ordinance. The order is effective until March 27 when a hearing on the company's application for the injunction will be held. Meanwhile the company will continue to collect the 6-cent fare. Under the order attorneys for both sides are required to furnish the opposing side with copies of all schedules and data to be submitted at the hearing. Judge Trieber announced that if the injunction is granted it will be under the terms that the company will be required to issue 1-cent certificates for each 6-cent fare paid, the certificates to be redeemable in the event a permanent injunction is denied.

Wants Lower Fares.—As a part of the fight in Fort Worth, Tex., for reduced electric railway fares, petitions have been presented to the Mayor and City Commissioners asking that the city ordinance prohibiting the operation of jitney buses within the business district be rescinded and that the car fare be reduced from 7 cents to 5 cents for adults and from 3½ cents to 3 cents for children and students. The situation in Fort Worth has remained in statu quo awaiting final decision in the Galveston street car fare case, which has been taken before the Supreme Court of the United States, and it has been announced that the city will do all in its power to force a reduction in fares, but that no action can be taken until the Galveston case is decided.

Circuit Court of Appeals Hears Louisville Dispute

The dispute between the city of Louisville, Ky., and the Louisville Railway over the company's action in raising the fare from 5 to 7 cents had the attention of the United States Circuit Court of Appeals at the opening of the March session of that tribunal at Cincinnati, Ohio. The side of the city was presented and argued by Joseph S. Lawton and that of the company by Churchill Humphrey. The case was submitted for decision. It is before the court on the appeal by the city against the injunction granted by Judge Evans of the Louisville Federal Court stopping the city authorities from passing legislation to compel the traction company to reinstate the 5-cent fare. Attempt was made months ago to have the Supreme Court pass upon some questions bearing on the dispute, but the court refused to intervene and the decision was left to the United States Circuit Court of Appeals.

City Asks for Rate Rehearing

A petition has been filed by the city and county of Denver asking for a rehearing of the rate case of the Denver (Col.) Tramway recently decided by the United States Circuit Court of Appeals of the eighth district at St. Louis, Mo. Denver's right to contract through franchise is insisted upon and the court is urged to withdraw its decision which sustained the finding of the Federal District Court of Colorado and which is the authority of the receiver of the Denver Tramway for the collection of the present 8-cent fare.

In their opening arguments the attorneys for the city frankly state there are some broad expressions in the opinion of the Circuit Court of Appeals in this case which are so far reaching in effect that they not only would nullify the fare provisions in the franchises in the instant case but which rulings would seriously affect other franchises now in force in Denver and other parts of the state and seriously interfere with the making of franchise contracts in the future.

Court Decision Helps Railway

The Supreme Court of New Jersey has handed down a decision affecting the operation of jitneys within the state which is of importance to Public Service Corporation of New Jersey.

The Legislature of 1921 passed an act placing jitneys under the jurisdiction of the Public Utilities Commission, but made an exception of those licensed prior to March 15, 1921. The Public Utilities Commission assumed the position that under the act it had no power to prevent the transfer of jitney licenses granted prior to March 15, 1921. The Public Service Corporation of New Jersey took exception to this position and appealed to the Supreme Court. In a decision rendered recently the court overruled this contention and said the transfer of a jitney license is practically an application for a new license and should the jitney be considered unnecessary the license can be refused.

The jitney owners have been selling their licenses indiscriminately and purchasers claimed the privilege to operate under them and that the commission could not prevent it, no matter whether the jitney was necessary or not. It is not known at present just what percentage of jitneys will be affected by the decision, but it is believed to be quite a substantial number.

Seeks Increased Rates

The Jersey Central Traction Company, Keyport, N. J., has asked the Board of Public Utility Commissioners for permission to increase the fare from 7 to 10 cents. The company in its petition claims that it is operating at a loss, the deficit for last year being $120,000, according to Superintendent William H. Hitchcock. Mr. Hitchcock says that if the increase is not granted the matter of deciding whether cars will be run will be left in the hands of the executive offices of the company. The company operates from Perth Amboy to Red Bank and Highland Beach and to maintain its tracks alone is a great cost. At the present time the company is facing the problem of locating the tracks on Broadway, Keyport, and relocating the tracks on the bridge over the Raritan river between South and Perth Amboy. The company will also have to make other improvements that will cost enormous sums. The traction company was allowed by the commission to increase its fare on two occasions until it reached 7 cents.

Transportation News Notes

Freight Rates Cut.—The Buffalo & Lake Erie Traction Company, operating between Buffalo, N. Y., and Erie, Pa., has filed notices of 50 per cent cuts in freight rates on everything transported with the exception of bread, milk and newspapers.

Loading Time Cut in Half.—Time for loading passengers has been cut in half by the Georgia Railway & Power Company by means of street collectors stationed at the front end of cars. This double collection of fares in the downtown section made it possible for passengers to enter at both front and rear. Safety zones have been marked off in the congested district with ropes and wooden standards, and automobiles, as a result, can pass cars while passengers are boarding them.

Increased Fares Refused.—As a result of a rehearing granted the Westchester (N. Y.) Street Railway with respect to a fare increase, the Public Service Commission has denied the application of Leverett S. Miller, receiver for the property. The present rates were fixed by the commission's order of April 7, 1921. In handing down the opinion Commissioner Semple said that although the revenues produced no fair return upon the company's investment, still they carried the operating expenses and up-keep as well as taxes with a trifle over.

Elevated Line for Brooklyn.—An elevated line, instead of a subway will be constructed for 2½ miles in Brooklyn, N. Y., from McKibben Street, near Bushwick Avenue, to a connection with the existing Brooklyn Rapid Transit elevated railroads at East New York. This follows a vote by the Transit Commission. Commissioner Harkness said that bids would be called for at once. The new line will relieve congestion at Canal Street and Broadway, Manhattan, by providing a route from that station in connection with the Canarsie line of the Brooklyn Rapid Transit.

Token Carriers for Sale.—A new token-carrier is going to be put out by the Connecticut Company, New Haven, Conn., which ought to do away with one of the main objections to the tokens, namely, the difficulty in handling and carrying them. This device, which is only an inch and a half long, holds ten tokens, five in each end, and the tokens, which are always in sight, are ejected one at a time by a slight pressure of the thumb. They are easily refilled. The company has not announced how it will sell the containers, but it is understood that they will cost only 5 cents.

Syracuse Fare Hearing Postponed.—The hearing of the complaint of the city of Syracuse, N. Y., against the New York State Railways on the one-man car operation and the 8-cent fare will be continued before the Public Service Commission on March 31. Evidence submitted by the company showed a net saving in operations from the one-man cars of $70,758 from March 24, 1921, to Feb. 1, 1922. Savings for the present calendar year the company estimated would be $107,758. Evidence was also submitted showing one-man cars were 93.2 per cent on time, while the two-man cars were 91.9 per cent on time.

May Prepare Lower Fare Ordinance.—The City Council of Pine Bluff, Ark., has appointed a committee of three aldermen to confer with officials of the Pine Bluff Company, looking to the reduction of fares. The present fare is 7 cents, while books of fifty tickets are sold for $3. It is stated that an ordinance will be prepared and adopted, compelling the local company to reduce fares. The ordinance has been scheduled for presentation to the City Council on March 20. The 7-cent fare went into effect here during the period of the war. The Council believes that fuel and operating costs have been reduced sufficiently for cheaper fares to be put into effect.

Personal Mention

Employees Made Directors

Two New Members Elected to Philadelphia Board to Further Plan for Employee Co-operation

John W. McElroy and Dr. A. A. Mitten were elected directors of the Philadelphia (Pa.) Rapid Transit Company at the annual meeting on March 15 to represent the employees. Their election puts into effect one of the ideas of management and men toward which President Thomas E. Mitten of the company has steadily been working since he took hold of the property in 1911.

It was quite logical under the plan of employee co-operation with the management that eventually employees representing the rank and file should sit on the board and that these two men should be elected to the directorate. Mr. McElroy is president of the Co-operative Welfare Association and Dr. Mitten is secretary of that body.

It may be true that Mr. McElroy expressed great surprise to the daily newspaper men after the meeting on March 15 that he had been elected, but it seems quite unlikely. Mr. McElroy is a modest, retiring man, and the truth would seem to be that these qualities in him, of which there was unmistakable evidence in his talk with the representatives of the ELECTRIC RAILROAD JOURNAL by whom he was interviewed, were taken by the daily newspaper men to mean an expression of surprise. He has been with the company since 1913 and is at present a yard man. He was born in Philadelphia forty-five years ago. He was educated in the public schools there and at the age of thirteen went to work in the mines as a breaker boy. Later he worked for the Newton Coal Company in Philadelphia.

As a new employee of the company Mr. McElroy entered at once heartily into the work of the Co-operative Association and has been a representative of the way department with the association since April, 1919. In 1920, 1921 and 1922 he was on the general committee of the association representing the way department and is a trustee and member of the organizing body of the Co-operative Welfare Association Saving Fund. He was elected president of the Co-operative Welfare Association in January, 1922. In this last capacity he helped to draw up the by-laws of the savings fund. The employees collectively own more than 30,000 shares of stock and the savings fund of the employees contains $1,000,000 of Philadelphia Rapid Transit bonds and car trusts. Mr. McElroy will be the responsible spokesman along with Dr. Mitten on the board of directors for the men owning these securities and will be held to accountability by them. He knows the men and their problems from close contact and thus will be able to reflect by his action on the board their hopes and aspirations.

Dr. Mitten is the only son of President Mitten. He is thirty-three years old. He was educated as a physician and surgeon and attained great proficiency as a hospital surgeon. He entered the electric railway industry as an industrial surgeon in Milwaukee in 1915. He served as captain of an ambulance company in France, was twice gassed, was wounded and then captured in August, 1918. Dr. Mitten was imprisoned at Villingen until the armistice. He is the understudy of President Mitten in co-operative welfare work. He has a particularly keen appreciation of the problems of the employees on account of his intimate contact with the men and as a result of his service abroad, where he gave unstintingly the best that was in him to his fellow men engaged in the struggle for military supremacy.

Promotions Announced by Virginia Company

The Virginia Railway & Power Company, Richmond, Va., has announced that beginning March 1, Herman Pollard, superintendent of schedules and inspections, assumed the duties of superintendent of transportation. He also has general supervision over all car operations. H. L. Smith, formerly superintendent of the Richmond Division, is now superintendent in charge of operation of cars from the Reservoir carhouse and in charge also of employees of the Reservoir terminal office. W. F. Bryce, who has been superintendent of the South Richmond and Interurban Divisions, has been placed in charge of operation of cars from the South Richmond carhouse and also in charge of the Seventh and Perry Streets terminal office employees.

J. M. Penick, engineer of maintenance of way, has been made chief engineer of railways, and in addition to his former work has general supervision over carhouses and shops.

Other changes in the personnel of the railway are as follows: W. J. Hicks is now master mechanic and J. F. Pond, superintendent of the Petersburg city lines.

Claus Spreckels Is Manager

Claus Spreckels, son of John D. Spreckels of the Spreckels transportation companies, has been made general manager of the San Diego Electric Railway, Point Loma Railway and San Diego & Coronado Ferries Company. William Clayton, who has been the managing director of the transportation companies under the control of the Spreckels, has retired.

C. S. Banghart Honored

General Manager of Augusta-Aiken Railway Nominated for President of Rotary Club

The many friends of Charles S. Banghart will not be surprised to learn that his executive ability and attractive personal qualities have already been recognized by his fellow citizens in Augusta, although it was only two years ago that he went there to become general manager of the Augusta-Aiken Railway & Electric Corporation. The nominating committee of the Rotary Club of that city has placed his name at the head of its ticket for officers for the coming year.

In commenting on this fact the Augusta *Chronicle* in a recent issue in its column, "Talking it Over," said:

> That is fine that Charlie Banghart is to be president of the Rotary Club for the next term of office. His nomination was announced yesterday, and the nomination is really the election.
>
> Than Mr. Banghart no man who has come to Augusta to make his home has made more friends. He is held in the highest and most cordial esteem by everyone who knows him. He is a man of the highest order of ability, thorough in his line, a hard fighter and a fair fighter for the interests he represents, and kindly and courteous at all times and in all things.

The Weekly Letter of the club for March 5 said in part:

> Although the head of the largest concern in Augusta employing strictly manpower, Charlie has always been democratic. He has always been approachable. He has never lost his sense of fun even in the most annoying moments of the railway controversy.

Some time ago Mr. Banghart talked on the traction situation before the Kiwanis Club, answering ten questions or charges sent to him in advance by interested persons. These questions were not easy ones and placed the burden of proof upon the company, but Mr. Banghart was convincing in his answers. The questions were as follows:

> It is said the Augusta-Aiken line is bonded for $6,200,000. Is it not more than the property is worth?
>
> Is not the Augusta-Aiken trying to pay dividends on watered stock?
>
> Why didn't the Augusta-Aiken run its tracks into the camp and buy more cars when it had an opportunity to increase its earnings?
>
> Why is the Augusta-Aiken asking an increase in power rate, when commodities are coming down?
>
> Why is it the Augusta-Aiken runs old, dirty, dilapidated noisy cars, operates on poor schedules, and charges a higher fare than is charged in Savannah or Atlanta?
>
> It is said the Augusta-Aiken cares nothing about the welfare of Augusta—only what they can get out of it!
>
> Why did the Augusta-Aiken ignore Council and the Railway Commission and take its case to the Federal Court?
>
> Why should not the Augusta-Aiken put its wires under ground? Is it not a contract with the city?
>
> The Augusta-Aiken will not move its tracks on Walton Way, or the Hill!
>
> The Augusta-Aiken pays large salaries to men in New York who do no work!

Mr. Banghart was made general manager of the Augusta-Aiken Company in 1919. From 1914 until that time he served as vice-president and general manager of the Binghamton, (N. Y.) Railway. He is a graduate of Lehigh University and has been connected with the Interstate Railway, Reading, Pa., and the New York & Queens County Railway, Long Island City, N. Y.

General Bancroft Dead

To Him Much Credit Is Due for the Model System Which Boston Now Enjoys

General William A. Bancroft, lawyer, former Mayor of Cambridge, Mass., and first president of the Boston Elevated Railway, died on March 11 at his home in Cambridge. He was sixty-seven years old.

General Bancroft assumed the duties of president of the elevated at its inception in 1899. Under him none of the functions of the company as a transportation agency was neglected. With the program of physical extension carried forward under him there also went forward the work of building up the personnel and of cultivating public good will. Thus the Boston Elevated was one of the first companies to raise its standards for men seeking employment. Discipline was also strictly enforced, a reflection no doubt of the military training of the General himself. The humanitarian side was not neglected, however, for the Boston company was one of the first to adopt the pension plan and to award bonuses at Christmas.

As for the physical side General Bancroft took hold of a system that at the end of 1898 contained 316 miles of track, collected 181,321,295 fares and issued about 28,239 free transfers. Ten years later the system comprised 474.45 miles of track, over which 273,132,584 passengers were carried. The number of free transfers, under the provisions of law, increased by about 500 per cent in ten years. In 1916, when the general retired as president to become chairman of the board, the company carried 363,477,041 passengers, but the transfer burden had become unbearable.

General Bancroft's connection with the street railways at Boston began in 1885, when he was chosen to the superintendency of the Cambridge Railroad. When the Cambridge roads were merged in the West End Street Railway combination General Bancroft was made roadmaster of the entire system. He took part in the electrification of the lines, which was begun in 1889.

In 1892 General Bancroft left the railway business temporarily. His occupancy, however, of the mayoralty chair in Cambridge in the years 1893-96 was no interruption in his preparation for important public service work. He was a member of the Cambridge Common Council in 1882, of the Massachusetts Legislature in 1883-85 and was president of the Cambridge Board of Aldermen, 1891-92. He was a graduate of Harvard and captain and stroke oarsman of the victorious Harvard University crews of the years 1877, 1878 and 1879.

Service in the militia up to the time of and through the Spanish war must be accounted as an important part of the training which General Bancroft has undergone. He started as a private in the Massachusetts volunteer militia in 1875 and ended as a major general on the retired list in 1901.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

San Francisco Calls for Bids on Light-Weight Municipal Cars

As announced in the rolling stock columns of the ELECTRIC RAILWAY JOURNAL for Feb. 11, the San Francisco Municipal Railway has issued specifications and a call for bids, to be opened March 29, on twenty to thirty new light-weight cars for the Union Street line. These will be single-truck, semi-steel, double-end, center-entrance and center-exit cars of a design practically the same as the experimental car which was built especially for the Union Street line and described in the ELECTRIC RAILWAY JOURNAL, Jan. 29, 1921, page 229. If the bids received are low the order is to be placed for the maximum number of cars, but if prices are considered high only twenty are to be purchased at this time.

The specifications are issued in four parts, being devoted to bodies, trucks, motors and air brakes respectively. Trucks, motors and air brakes are to be delivered to the body builder, where the cars are to be completely assembled so they can be shipped practically ready for service. Delivery of the first fifteen cars is to be made at San Francisco 160 days after the contract is awarded and the remainder are to be delivered within sixty days thereafter.

Some of the main features of the specifications are as follows:

Length of car over bumpers	29 ft. 10 in.
Maximum width of car over window sill	8 ft. 8½ in.
Height from top of rail to top of trolley board	10 ft. ⅜ in.
Truck wheel base	12 ft. 0 in.
Diameter of wheels (steel)	26 in.
Seating capacity, number of persons	32
Number of motors	2
Horsepower of motors, one-hour rating	50
Scheduled speed, including stops, miles per hour	10
Minimum center radius of horizontal curves over which cars will be required to operate	40 ft.
Minimum radius of vertical curves over which cars will be required to operate	276 ft. 0 in
Approximate weight of car body, including all equipment attached thereto but without passengers	14,500 lb.
Approximate weight of truck including wheels and axles, exclusive of motors	7,500 lb.
Approximate weight of motors, 2,100 lb. each	4,200 lb.
Approximate weight of complete car empty	26,200 lb.

The San Francisco city engineer's office also has in course of preparation and expects to issue some time in April specifications for twenty cars of standard size and weight for use on the several new extensions to the Municipal Railway which are now planned.

Progress is being made on the several proposed extensions of the Municipal Railway. The Duboce Avenue line into the Sunset District has been approved by the Board of Supervisors and the city engineer has been authorized to prepare details of an assessment district. The specifications for the Taraval Street line will be issued, it is expected, some time in March. Some of the material for the Masonic Avenue extension has been purchased.

Big Power Developments in the South

Many of the principal cities of North Carolina, South Carolina, Georgia and Alabama and in eastern Kentucky and Tennessee are now served by an interconnected power supply which rivals in territory served the proposed superpower district of the Northeastern Atlantic States. It extends from Nashville, Tenn., on the west to Goldsboro, N. C., on the east. Much new electric power equipment also is going into these and contiguous states. A list of some of the larger recent orders or additions to company equipment follows:

Southern Power Company	140,000 kw. hydro-electric
Alabama Power Company	60,000 kw. hydro-electric
Georgia Railway & Power Company	50,000 kw. hydro-electric
Alabama Power Company*	40,000 kw. steam
New Orleans Railway & Light Company	20,000 kw. steam
Smaller installations (aggregate)	40,000 kw. steam
Total	350,000 kw.

*This includes steam equipment at Warrior taken over from U. S. Government the early part of this year and installed during the war.

Indiana Service Corporation Operates New Substation

The Indiana Service Corporation of Fort Wayne, Ind., has put into operation its new substation at the corner of Webster and Melita Streets, Fort Wayne. When completed with all feeder lines and special switches the cost will be in the neighborhood of $130,000. The station is a one-story fireproof type of construction, laid out so that additions can be conveniently taken care of if wanted. The capacity of the rotaries used is 1,500 kw.

Metal, Coal and Material Prices

Metals—New York	March 14, 1922
Copper, electrolytic, cents per lb.	12.875
Copper wire base, cents per lb.	14.125
Lead, cents per lb.	4.70
Zinc, cents per lb.	5.037
Tin Straits, cents per lb.	28.875
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.60
Somerset mine run, Boston, net tons	1.875
Pittsburgh, mine run, Pittsburgh, net tons	2.15
Franklin, Ill., screenings, Chicago, net tons	1.875
Central, Ill., screenings, Chicago, net tons	1.75
Kansas screenings, Kansas City, net tons	2.50
Materials	
Rubber-covered wire, N. Y. cents per lb.	5.90
Weatherproof wire base, N. Y., cents per lb.	15.50
Cement, Chicago net prices, without bags	1.94
Linseed oil, (5-bbl. lots), N. Y., cents per gal.	94.00
White lead, (100-lb. keg), N. Y., cents per lb.	12.25
Turpentine (bbl. lots), N.Y., cents per gal.	88.00

Rolling Stock

Boston (Mass.) Elevated Railway expects to purchase 100 new surface cars during 1922.

Brockton & Plymouth Street Railway, Plymouth, Mass., expects to buy two standard Birney safety cars.

Houston (Tex.) Electric Company plans to purchase thirty-five new cars immediately. The total cost will be $270,000.

Louisville (Ky.) Railway has purchased 309 power-saving meters equipped with the car inspection dials from the Economy Electric Devices Company, for use on its city and interurban cars.

Atlantic & Suburban Railway, Pleasantville, N. J., has placed an order for new cars with the J. G. Brill Company, Philadelphia. These are to operate between Atlantic City and Somers Point. They will be of the pay-as-you-enter type.

Track and Roadway

City Railway, Dayton, Ohio, during 1922 will build 7,000 ft. of single track. All the material for the work is on the ground.

Carolina Power & Light Company, Raleigh, N. C., expects to build during the next few months 837 ft. of new track.

Pacific Electric Railway, Los Angeles, Cal., has received permission to construct a spur track railway across the north half of Philadelphia Street near Gregory Avenue in the City of Whittier.

Ottawa (Canada) Electric Railway during 1921 laid new rails on Wellington Street and on Somerset Street between Bank and Bay Streets. The new St. Patrick bridge was opened for traffic and the company's service resumed through to New Edinburgh.

Jamestown (N. Y.) Street Railway has petitioned the Common Council for permission to double track Prendergast and Spring Streets, between Third and Second Streets. It intends running cars on a loop system basis with the old Lyric Theater Building to be a terminal.

North Carolina Public Service Company, Greensboro, N. C., will maintain double car tracks on South Elm Street and will extend the double tracks on North Elm to the intersection of Church and Bellemeade Streets. The City Council recently approved of this improvement.

Birmingham Railway Light & Power Company, Birmingham, Ala., will put in operation about Jan. 15 the Norwood car line extension. This new extension around the Norwood Boulevard to Thirty-Second Street and Fifteenth Avenue is approximately a half mile long and will cost $40,000 according to officials of the Birmingham Realty Company, which is financing the extension. Grading work has been completed and ties have been laid for that portion of the line on Norwood Boulevard. This extension has been referred to previously in the ELECTRIC RAILWAY JOURNAL.

Power Houses, Shops and Buildings

Brockton & Plymouth Street Railway, Plymouth, Mass., will purchase one 300-kw., 600-volt direct current converter.

Colorado Springs & Interurban Railway, Colorado Springs, Col., is building an extension to its office, 21 ft. x 75 ft. The cost is estimated at $3,000.

The East Bay Division of the Pacific Gas & Electric Company, Sacramento, Cal., is to have a new office building in Oakland at Seventeenth and Clay Streets. It will be ready, according to present plans, before the end of 1922.

New Orleans Railway & Light Company is installing a 20,000-kw. turbogenerator in its Market Street power plant. A surface condenser of 33,000 sq.ft. will go with the auxiliary pumping and piping equipment. The work is being done by the Dwight P. Robinson & Company organization.

Boston (Mass.) Elevated Railway will purchase within the next few weeks two boilers for installation at the South Boston power station; build an addition to the boiler room at the South Boston power station, build a new inspection shop for elevated cars at Forest Hills, and at a later date will start work on the consolidated shops at Everett.

Franchises

Northern Texas Traction Company, Fort Worth, Tex., has been granted a francise by the City Commission for extending a new line from Hemphill along Bowie Street to South Adams and thence south to Shaw Street. The new line will serve a densely populated portion of the Tenth Ward hitherto without service.

New Incorporation

Electric Railway Finance Corporation, London, Eng., has been registered with a capital of £500,000. It has a very influential directorate and first subscribers take a large part of shares. The company expects to carry out financial and commercial operations of every description, to carry on iron, coal and engineering business, to act as railway contractors, to manufacture railway materials and rolling stock and electrical apparatus and machinery.

Trade Notes

Service Motor Truck Company, Wabash, Ind., has announced the appointment of John D. Ristine as manager of sales in the Railroad Division.

Economy Electric Devices Company, Chicago, Ill., has designed a graphic form for use in plotting operating, statistical and engineering data. The company announces that immediate shipment can be made on this form.

The Car Turnstile Company, business offices at 383 West Fayette Street, Syracuse, N. Y., has been organized to market the Syracuse Car Turnstile system of controlling the operation of rear-entrance front-exit one-man cars introduced in Syracuse some time ago and described in the issue of Jan. 28. William H. Lawyer is president of the new corporation, and Albert C. Coon is secretary. It is reported that electric railway men from various cities have visited Syracuse to observe the system in operation.

Combustion Utilities Corporation, New York, N. Y., was organized at the first of the year, with headquarters at 60 Wall street. The company is composed of an old organization of Henry L. Doherty & Company, and the Industrial Heating Department. This latter organization grew out of the old Toledo Railway & Light Company, Toledo, Ohio. The new company will market what it calls fuel service, that is, it will analyze the customer's requirements, advise as to the proper fuel and furnace equipment, and after the installation, service engineers will work to gain the best results.

New Advertising Literature

Schweitzer & Conrad, Inc., Chicago, Ill., has issued Bulletin No. 105-A descriptive of its high voltage detector.

Henry Wells Oil Company, London, England, has issued a third edition of a booklet entitled "Germ Process Motoils." This gives information regarding lubrication tests and other data of the company's oils.

The Uehling Instrument Company, New York, has just issued Bulletins Nos. 220 and 221, on combustion economies, which are the first of a series to be issued dealing with combustion and the cost of power. Bulletin No. 220 treats of the magnitude of the power plant chimney loss and gives a table showing the heat carried away by the chimney gases per pound of combustible. Bulletin 221 gives the relation between CO_2 and the money wasted up the chimney. Tables and graphs are included showing the per cent lost up the chimney for solid and liquid fuel and for gaseous fuel and examples are given in fuel saving, resulting from increasing the amount of CO_2.